Marine Review

The National Publication Covering the Business of Transportation by Water

CLEVELAND FOUNDED 1878 NEW YORK

Published monthly by
The Penton Publishing Co.
Cleveland, Ohio, U. S. A.

Cleveland Office, Penton Bldg.
A. H. Jansson, *Editor*
H. O. Taylor, *Advertising Manager*

Chicago Office, 1347 Peoples Gas Bldg.
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London Office, Caxton Ho
Westminster, S. W. 1
Vincent Delport

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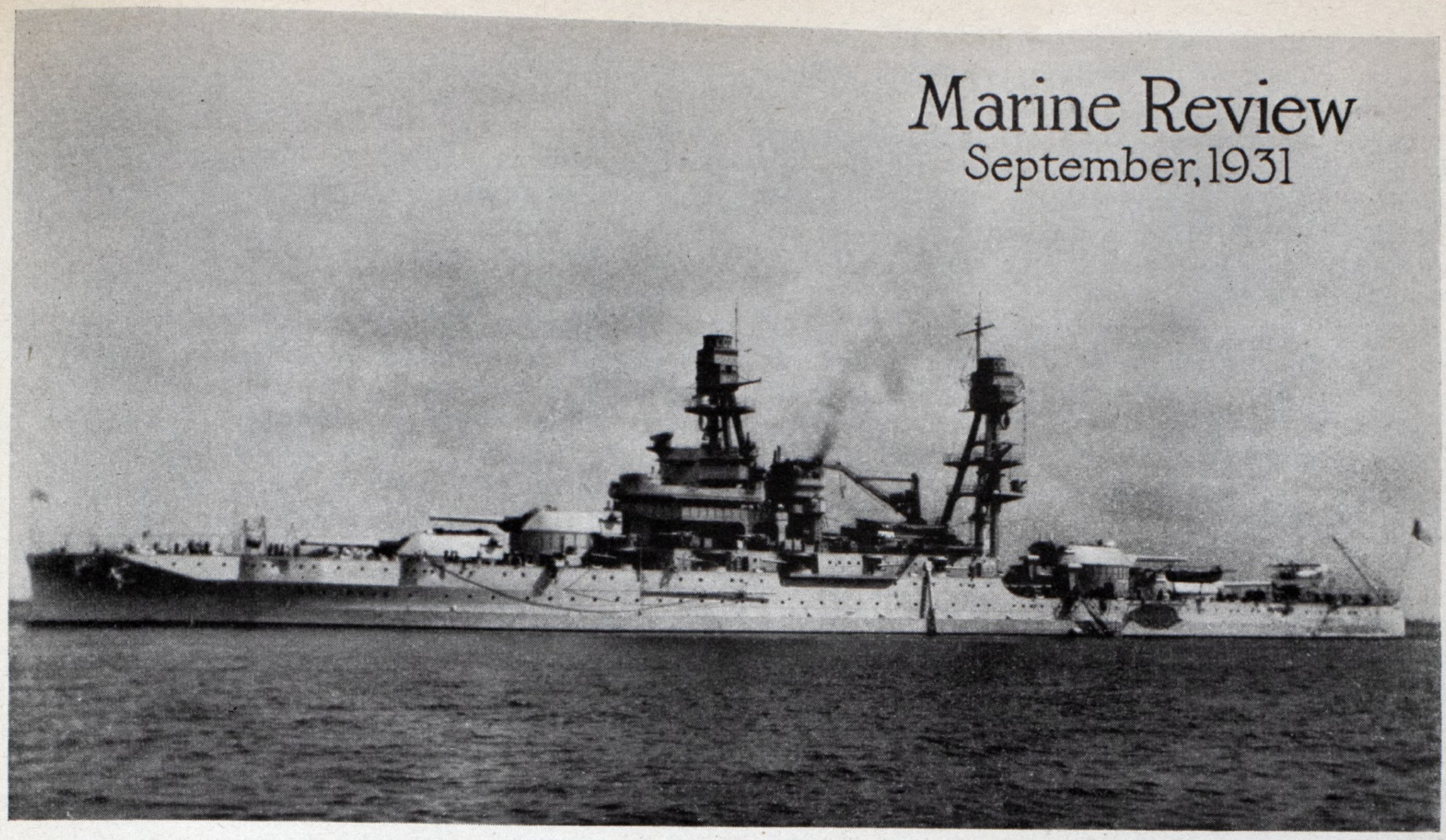
Vol. 61 **September 1931** *No. 9*

MARINE REVIEW is a member of the Audit Bureau of Circulations, Associated Business Papers Inc. and the National Publishers Association. Entered at the Post Office at Cleveland, Ohio, as Second Class Matter, under the act of March 3, 1879.

Subscription United States and its possessions, $3 per year; Canada $4.00; Great Britain and other Foreign Countries, £1:0:0. Single copies 35 cents. Back numbers over three months 50 cents. Cable addresses: Penton, Cleveland, and Irotrapen, London.



The new U.S.S. Pennsylvania after two years at the Philadelphia Navy Yard undergoing elaborate modernization costing $7,500,000

« EDITORIAL »

Modernizing Our Battleships Strengthens Naval Forces

THE navy is our first line of defense and the battleship, though opinions may vary, is still the backbone of the navy. It is therefore of special interest to note that the U. S. S. PENNSYLVANIA, first commissioned June 12, 1916, has just completed an elaborate program of modernization and is now ready to resume her original position as flagship of the United States fleet. This powerful fighting ship was authorized by congress Aug. 22, 1912. Her keel was laid Oct. 27, 1913, at the Newport News Shipbuilding & Dry Dock Co. She was launched March 16, 1915, and was first placed in commission June 12, 1916. At that time, on a draft of 28 feet 10 inches, her displacement was 31,400 tons and she represented a total expenditure of about $13,000,000.

On her builder's trials, held Feb. 27, 1916, off Rockland, Me., her fastest mile was 21.75 knots and for the five high speed runs, she developed an average speed of 21.38 knots. In her memorable career of 13 years before her reconditioning she established a high reputation for efficiency and dependability. During this period she steamed nearly 300,000 miles.

Her modernization, for which congress appropriated $7,500,000, began on May 2, 1929, at the Philadelphia navy yard. In June of this year her standardization trials following the completion of her reconditioning were successfully held off Rockland, Me. Her commanding officer is Capt. J. M. Enochs, U. S. N. She has been transformed from a prewar veteran of the old "dreadnaught" design to a modern vessel of war embodying all the formidable features of post-war and recent capital ship development. The old cage masts and hooded ventilators, long distinctive features of American battleships, are gone. The conning towers are now supported by two rugged tripods.

It is evident from the accompanying illustration that the top hamper has been reduced to a minimum. This is in order to provide a wide sweep for the antiaircraft guns. The broadside battery has been raised a whole deck above its former location. A new deck serves as foundation for the new antiaircraft guns. Additional steel decking protects the vessel against the fall of shot from high angle fire and from aircraft bombs.

An important part of the reconditioning has been the complete reboilering with new express

type of boilers and the installation of new turbines. This new propelling machinery will enable the PENNSYLVANIA, though of 3600 tons greater displacement than originally, to maintain her former speed. The additional displacement is made up principally by "blisters," added to increase the defense against torpedo or under-water bomb damage, and some additional weight of armor.

Special attention has been given to the fire control apparatus to increase speed and accuracy of fire. Little change is apparent in the 14-inch gun turrets, but these also have been modernized so that the guns come through with increased angles of elevation and consequently increased range.

It is interesting to note some of the principal particulars of the PENNSYLVANIA before and after reconditioning. We have already referred to her displacement. Her length remains the same; the beam, formerly 97 feet, is now 103 feet; and the draft has been increased from 29 to 31 feet. The main propelling machinery horsepower has been increased from 31,500 to 33,375. As formerly there are twelve 14-inch guns and there are now twelve 5-inch instead as of formerly 14; and there are now eight 5-inch instead of formerly eight 3-inch guns.

In modernizing this vessel the navy has added to its forces a powerful, efficient, up-to-date battleship incorporating the many advances in naval design since she was originally laid down. Furthermore all this has been done in much less time and at probably not much more than one-quarter of the cost of a new vessel of this power.

Keeping Ships' Bottoms Clean

THE fouling of ships' bottoms continues to be a practical problem to the ship operator. He fully recognizes the losses due to the greater resistance or slowing down of speed of a foul ship. To maintain the same speed if that is possible, more fuel must be consumed and the loss of ships' time due to less speed may be even more serious. For this reason good ship operation calls for drydocking not less than once every six months in ordinary services and more frequently if the ship is trading to parts where marine growths are unusually prolific.

Drydocking for the purpose of cleaning the bottom of the ship is an economic necessity and is therefore worthwhile, but if the shipowner could find some really reliable and not expensive antifouling preparation, it would represent a definite and considerable saving. There are paints commercially sold which are supposed to have this beneficial property. Nothing entirely satisfactory, however, seems yet to have been developed.

Here is a problem that the navy is vitally interested in and it has encouraged research in an attempt to discover a practical solution. The navy is at present using a paint made of domestic materials and at a fairly low cost, but it is not entirely satisfactory and the navy department in co-operation with the chemical warfare service is actively studying the problem and is now working on two different types of paint according to a recent bulletin of the United States Army Recruiting News.

The first of these is a hot plastic substance which is supposed to be applied in a melted condition which solidifies on cooling. The other resembles a varnish and is applied cold. The plastic paint, which forms a much heavier coat, is more expensive. The chemical warfare service has developed a paint of this type which is now being tried out on the hulls of several destroyers. Indications are, that though this type of paint is more costly, it would be economical to use, especially on long voyages.

The principal object in the solution of this problem has been to find the proper relation between the carrier and the toxic. Of all the poisons of a large number tested, nothing so far has been found so effective as the oxides of copper and mercury. For a carrier resin modified by coal tar, other gums and a variety of synthetic resins seem to prove out the best. The tests under way by the navy will continue for a period of years and it is hoped that the ultimate solution will be of great practical value to the shipping industry.

Some important work along this line, or at least in the study of the habits of marine growths, is being carried out by Dr. J. Paul Visscher, head of the department of biology of Western Reserve university. He has spent the past summer at the Carnegie Institute's marine laboratory on the Tortugas islands in the Gulf stream south of Key West and he is of the opinion that until we learn all about barnacles and the reasons for their behavior, the problem of coating ships to keep them off will not be solved.

Naming United States Liners

THE United States lines will welcome suggestions for naming the two ocean liners now building for transatlantic service. Perhaps something entirely novel and new would be best. But it is difficult to get away from a certain attraction to those names that stand out in the country's sea traditions in the exploits of the navy and in the days of our maritime glory when the American flag was well known in all parts of the world.

The CONSTITUTION and CONSTELLATION of the early naval vessels and famous names like STAG HOUND, FLYING CLOUD, SOVERIGN OF THE SEAS and GREAT REPUBLIC of the clipper ship era, naturally come to mind. To live up to any of these names a present day ship would set a high goal of achievement.

Shipping Board Makes Survey Of Ocean Marine Insurance

THE bureau of finance of the United States shipping board has just completed a survey of marine insurance written by American and foreign companies in the United States during the calendar year 1930.

Reports have been received from 64 American companies and 33 admitted foreign companies. These represent practically all companies writing ocean marine insurance in the United States. All American companies with one exception engage in fire and automobile insurance. Marine insurance constitutes only a small proportion of their total business. The marine departments of these companies are grouped together under various agencies, with reinsurance arrangements whereby risks are redistributed; this distribution of reinsurance appears to be about equally divided between American and foreign companies.

Total premiums received by American and foreign companies in the United States for hull and cargo insurance amounted to $50,740,000. This is $10,000,000 less than reported last year. There had been a corresponding drop in cargo premiums as compared with last year, while total hull premiums remained about the same. Hull premiums received by American companies, however, increased by about $1,000,000, whereas cargo premiums received by these companies dropped $6,000,000.

American insurance companies reported $40,315,000 as original premiums. Of this amount 52 per cent was for cargo insurance and 48 per cent for hull; a decrease in percentage of cargo insurance and an increase in percentage of hull insurance, as against 60 per cent and 40 per cent, respectively, for the previous year. Of the total hull insurance premiums $19,4000,000, approximately $11,000,000 was distributed as reinsurance with various American and foreign companies. Of the total cargo premiums of $21,000,000 there was distributed as reinsurance $16,500,000. As indicated above, this reinsurance on hull and cargo business is about evenly divided between American and foreign companies. Out of a total of $40,315,000 premiums received by American companies, 10 per cent was sent abroad for reinsurance, as compared with 12 per cent last year. This amount, however, repesented only about one-sixth of all reinsurance by American companies. In other words, out of the total of $27,500,000 reinsurance premiums, $4,400,000 went to foreign non-admitted companies, $9,400,000 to foreign admitted companies, and $13,800,000 to American companies.

Foreign insurance companies admitted to do business in United States reported total original premiums as $10,425,000, of which 70 per cent was for cargo premiums and 30 per cent for hull. Cargo premiums were $7,300,000, representing a decrease from previous year of about $4,000,000. The hull premiums, $3,000,000, were half a million dollars less than last year.

The accompanying table indicates comparative amounts of hull and cargo premiums as between American and foreign admitted companies, in United States, during calendar year 1930. These figures may appear complicated by reason of difference in classes of reinsurance, and by way of clarification the figures are re-stated in another form, as follows:

Questionnaire reports from American companies indicated a total of $60,069,000 premiums. As this sum included all premiums received by each company, the reinsurance as between these companies was duplicated. Accordingly, the amount of "American-to-American" reinsurance premium is deducted ($13,663,000), indicating a total premium in American companies of $46,406,000. From this amount there is a further deduction of premiums received by way of reinsurance from foreign admitted companies ($6,091,000), leaving a total original premium by American companies of $40,315,000. On the other hand, foreign admitted companies reported a total premium of $25,300,000 from which is deducted the duplicated "foreign to foreign" reinsurance of $5,393,000, indicating a total premium for foreign admitted companies of $19,907,000. From this figure there is a further deduction of $9,482,000 representing reinsurance received from American companies, leaving a total original premium amounting to $10,425,000.

These figures do not include insurance on American ships placed directly abroad with foreign companies; an attempt is being made to ascertain the amount of this class of insurance from the annual reports of shipowning companies, as submitted on the new shipping board annual report form.

It is noted that the American marine insurance syndicates, which represent the American hull insurance market, and which includes both American and foreign admitted insurance companies, received a net amount of $6,809,318 for ocean hull premiums, and $1,249,603 for lake hull premiums, a total of approximately $7,100,000. Total syndicate premium last year was approximately $8,000,000.

The total net premiums remaining within United States for hull and cargo insurance in 1930 were $44,202,000, as compared with $51,746,000 for 1929.

Insurance Premiums Reported

	1930
By American companies	$60,069,000
Reinsurance (deduct)	19,754,000
Total American premiums	$40,315,000
By Foreign companies	$25,300,000
Reinsurance (deduct)	14,875,000
Total Foreign premiums	$10,425,000
Total original premiums—American and Foreign	$50,740,000

Cargo Premiums Reported

By American companies	$33,468,000
Reinsurance (deduct)	12,560,000
Total American Cargo Premiums	$20,908,000
By Foreign companies	$16,770,000
Reinsurance	9,382,000
Total Foreign Cargo premiums	$ 7,388,000
Total Cargo premiums	$28,296,000

Hull Premiums Reported

By American companies	$26,601,000
Reinsurance (deduct)	7,194,000
Total American Hull premiums	$19,407,000
By Foreign companies	$ 8,530,000
Reinsurance	5,493,000
Total Foreign Hull premiums	$ 3,037,000
Total Hull premiums	$22,444,000
Grand Total Cargo and Hull Premiums	$50,740,000
Reinsurance with Foreign Non-Admitted Co's.	$ 6,538,000
Net Premiums Within United States	$44,202,000

American Companies

	PREMIUM 1930
Reinsurance on Hull with American Companies	$ 5,281,671
Foreign Admitted Companies	4,336,224
Foreign Non-Admitted Companies	1,347,655
Total Hull	$10,965,550
Reinsurance on Cargo with American Companies	$ 8,381,080
Foreign Admitted Companies	5,145,282
Foreign Non-Admitted Companies	3,060,660
Total Cargo	$16,587,022

Foreign Companies

Reinsurance on Hull with American Companies	$ 1,911,849
Foreign Admitted Companies	1,156,635
Foreign Non-Admitted Companies	735,808
Total Hull	$ 3,804,292
Reinsurance on Cargo with American Companies	$ 4,179,484
Foreign Admitted Companies	4,236,378
Foreign Non-Admitted Companies	1,393,803
Total Cargo	$ 9,809,665

Two United Mail Ships are Launched

Talamanca and Segovia—Sponsored by Mrs. Herbert Hoover in twin Launching at Newport News—Enter Service in December and February

ON NUMEROUS occasions in the history of the Newport News Shipbuilding & Dry Dock Co. there have been twin launchings at the shipyard in Newport News, Va. Probably the outstanding event of that nature was the launching of the first two battleships the yard built for the United States navy, the KEARSARGE and KENTUCKY, on March 24, 1898. Multiple launchings were, of course, a common thing during the World war period and all precedents in shipbuilding were broken during that comparatively short period of exceptional activity. However, if that particular period is excepted, the occasions when two sister ships of medium or large size have been launched practically simultaneously in any of the shipyards on either the Atlantic or Pacific coasts of the United States are exceedingly few, particularly so in the last decade.

That is one reason why the twin launching of the TALAMANCA and SEGOVIA on Aug. 15, 1931 at Newport News, Va. deserves more than passing notice. Another reason is, of course, the fact that they had the honor of being sponsored by Mrs. Herbert Hoover, wife of the nation's Chief Executive. It was indeed a notable gathering which witnessed the christening of the two vessels by the "First Lady of the Land," with water collected from various rivers in Central America. In addition to the distinguished sponsor, prominent among those in attendance at the ceremony, were diplomatic representatives from all the Central American countries to which the vessels will trade when they go into service.

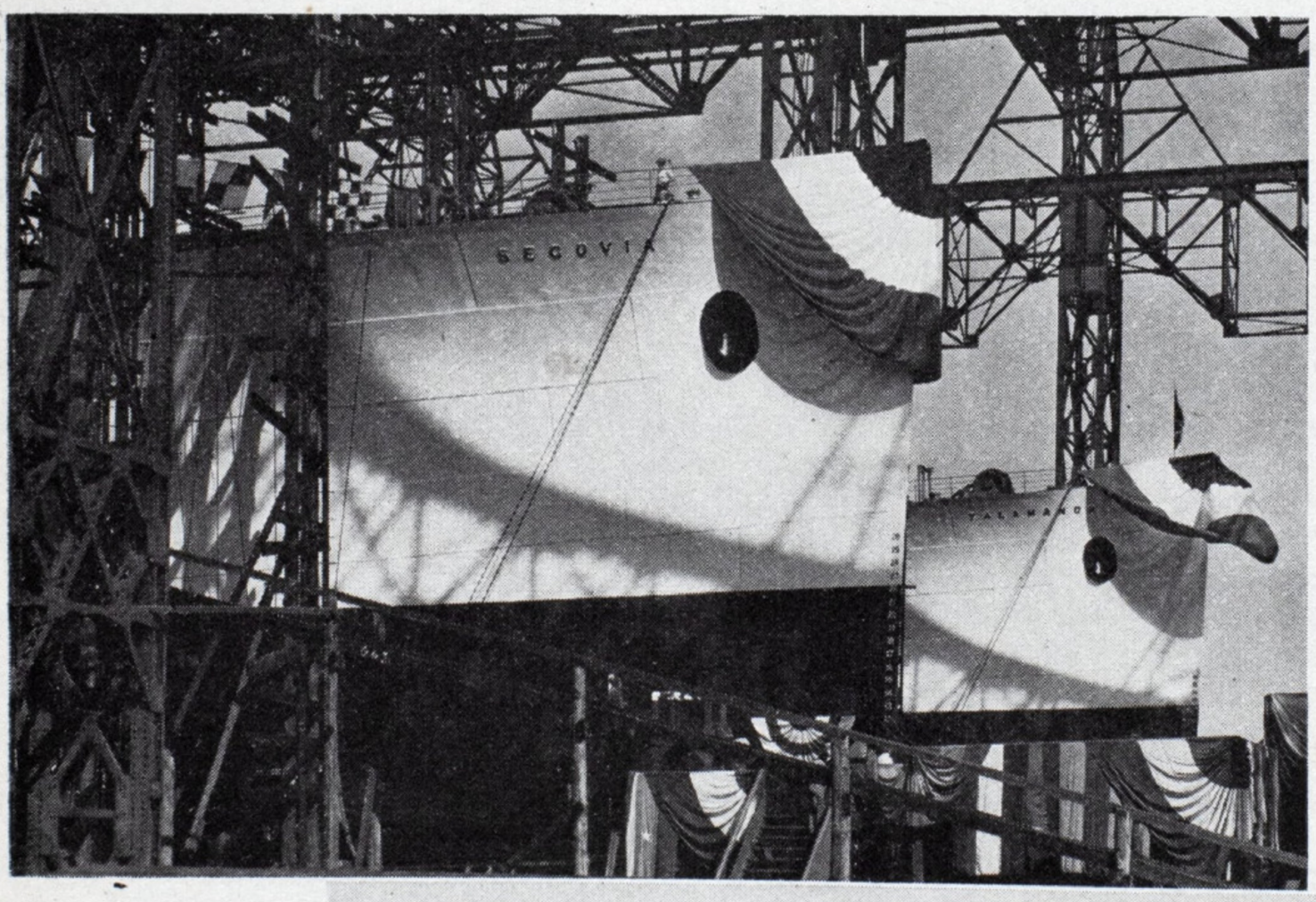
The First of Six New Vessels

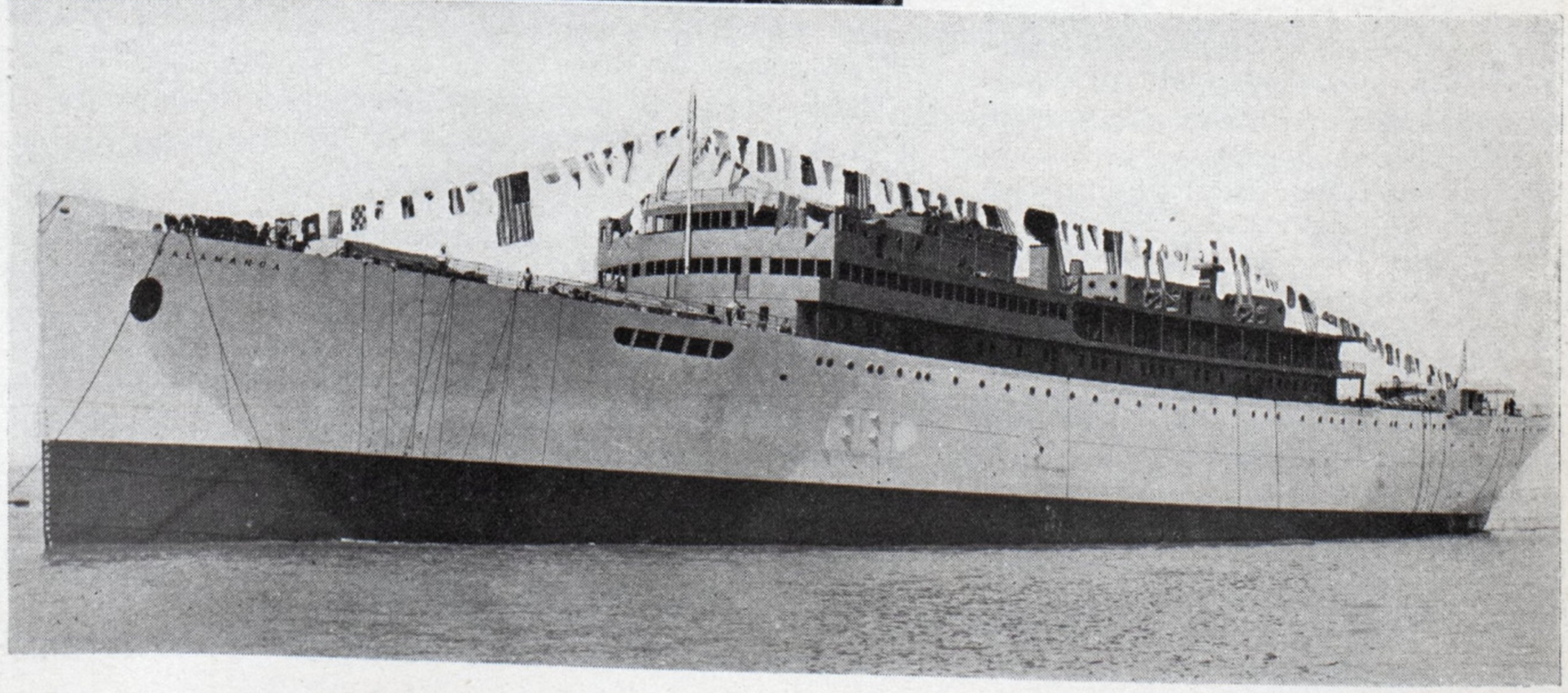
The TALAMANCA and SEGOVIA are the first of a fleet of six sister ships now under construction for the United Mail Steamship Co., a subsidiary of the United Fruit Co. Three of the vessels are being built by the Newport News Shipbuilding & Dry Dock Co.; the third, to be named CHIRIQUI, will be launched in the latter part of this year. The other three ships, the ANTIGUA, QUIRIGUA and VERAGUA are to be launched before the first of the year at the Fore River plant of the Bethlehem Shipbuilding Corp., Quincy, Mass. In practically everything except length (and in that particular only two of the older vessels exceed) the new vessels exceed all other vessels of "the great white fleet," as the United Fruit ships are popularly known, which is such an important factor in passenger service to Central American countries and in the fruit carrying trade.

The principal dimensions and particulars are as follows:

Length over all, feet	447
Length on waterline, feet	430
Length between perpendiculars	415
Beam, feet	60
Depth to upper deck, feet, inches	34-9
Load draft, feet, inches	24-6
Displacement at load draft, tons	11000
Gross tonnage,	about 7200
Sea speed, knots	about 18

The vessels have four decks in the hull proper, a combined forecastle and bridge, a poop, and three tiers of steel deck houses above the bridge deck. They are twin screw, have one smoke stack, and are rigged with two steel masts. The main hull is subdivided into nine compartments by eight watertight bulkheads, all of which extend to the upper deck or above; the subdivision thus provided is in excess of the requirements of the international conference (1929) on safety of life at sea, and makes them "two compartment" vessels, able to keep afloat with any two compartments flooded. A





Above: The Segovia and Talamanca Ready for a Twin Launching at Newport News, Va., Aug. 15. The Sponsor was Mrs. Herbert Hoover, wife of the President

At Right—The Talamanca in the James River at Newport News Just After Launching

complete double bottom is fitted, as usual, and is subdivided by a watertight vertical keel and watertight or oiltight floors into compartments for carrying fuel oil and fresh water, or when necessary, water ballast.

Between No. 1 hold and the boiler room there is a duct keel through which drainage and other pipes are run, to keep them out of the cargo spaces. In addition to the fuel oil compartments in the double bottom, there are large transverse deep tanks forward of the boiler room. These tanks are built entirely clear of the cargo hold and of the shell, a cofferdam being provided at sides, on top and in back of them, in order to prevent any possibility of oil leaking into the cargo space or streaking the ship's side.

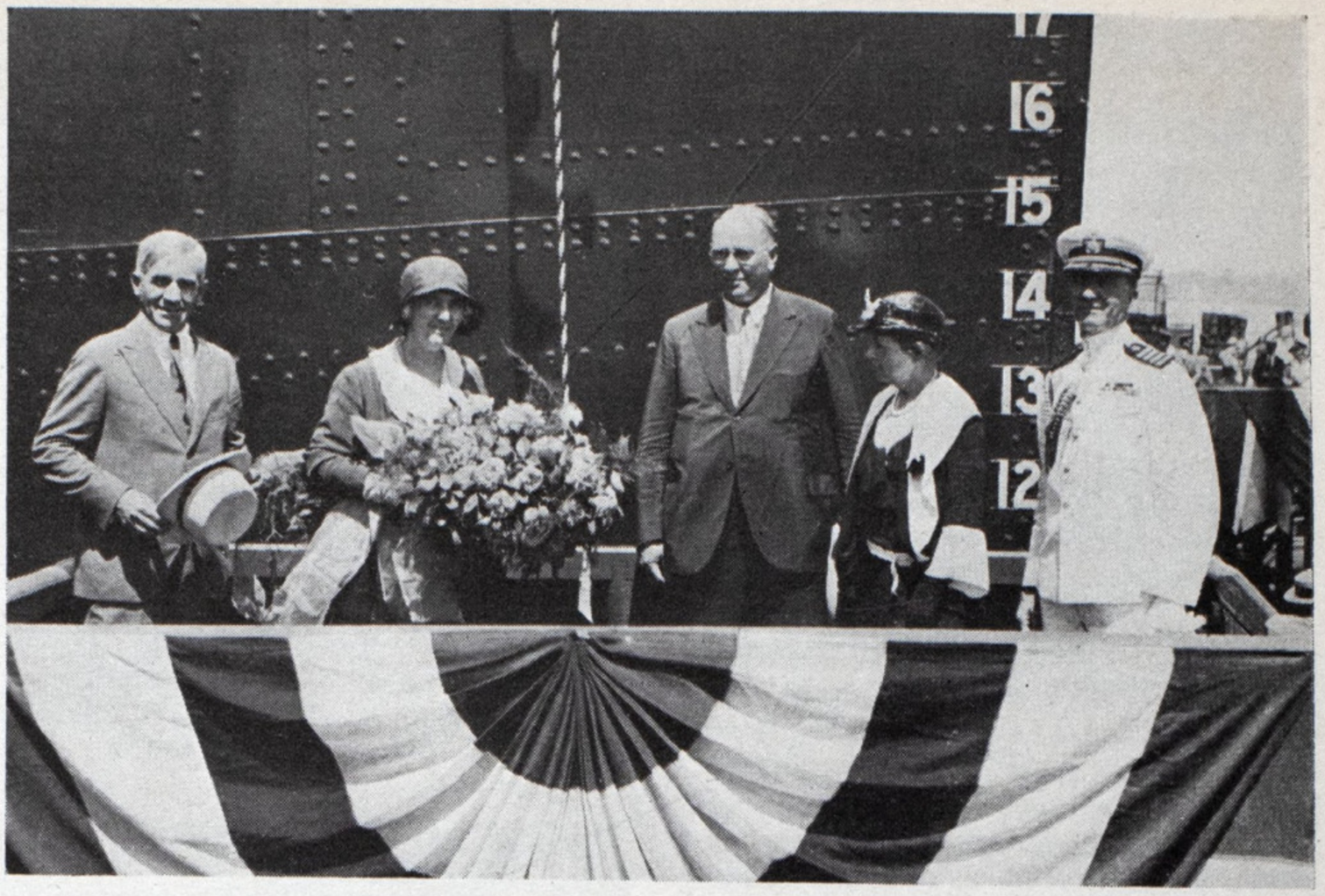
Fruit, General Cargo, Hatches

All spaces available for cargo are insulated and are provided with refrigerated air for the carriage of fruits, particularly bananas. In a separate compartment aft of the main engine room there is a complete refrigerating plant consisting of three sets of York CO_2 compressors,, etc. which provide the necessary brine circulation through the air coolers which are fitted in eleven of the fourteen fruit carrying compartments. Motor driven fans are fitted in conjunction with these air coolers to circulate cold air through ducts carried all around each compartment. The refrigerating plant is capable of maintaining a temperature of 53° Fahr. for fruit and of reducing the temperature of a full cargo of bananas to that temperature in approximately 24 hours under tropical conditions. There is also a separate ammonia type plant for use with a special cargo space which is provided at the after end of the main deck.

Provision is also made for carrying general cargo, and especially large hatches are fittted in No. 2 hold to allow railroad iron and large pieces of machinery to be shipped. Each of the four main cargo holds has a hatch in the weather deck which will be worked by two booms and electric winches. All the regular cargo booms are located on tables at the two masts. and in addition there is a 30-ton boom on a pedestal aft of the foremast for use in No. 2 hold. Cargo ports are fitted in all main 'tween deck compartments, principally for use in loading and unloading fruit.

Accommodations are provided for about 115 first class passengers in 61 rooms. A number of the staterooms are single, and in none of them will more than two beds be fitted. There are two special suites containing a sitting room, stateroom with twin beds, and a private bath, all of which will be especially decorated and furnished. There are also fourteen staterooms with twin beds and either private or connected bath, and nine single rooms with private shower and toilet.

All staterooms will be provided with running water lavatories and will be mechanically ventilated. The public spaces will be in keeping with the high standard of the accommodations provided for the passengers, and are quite extensive. They comprise large entrance lobbies a library, lounge, smoking room, and the unusual feature of a glass-enclosed deck ballroom.



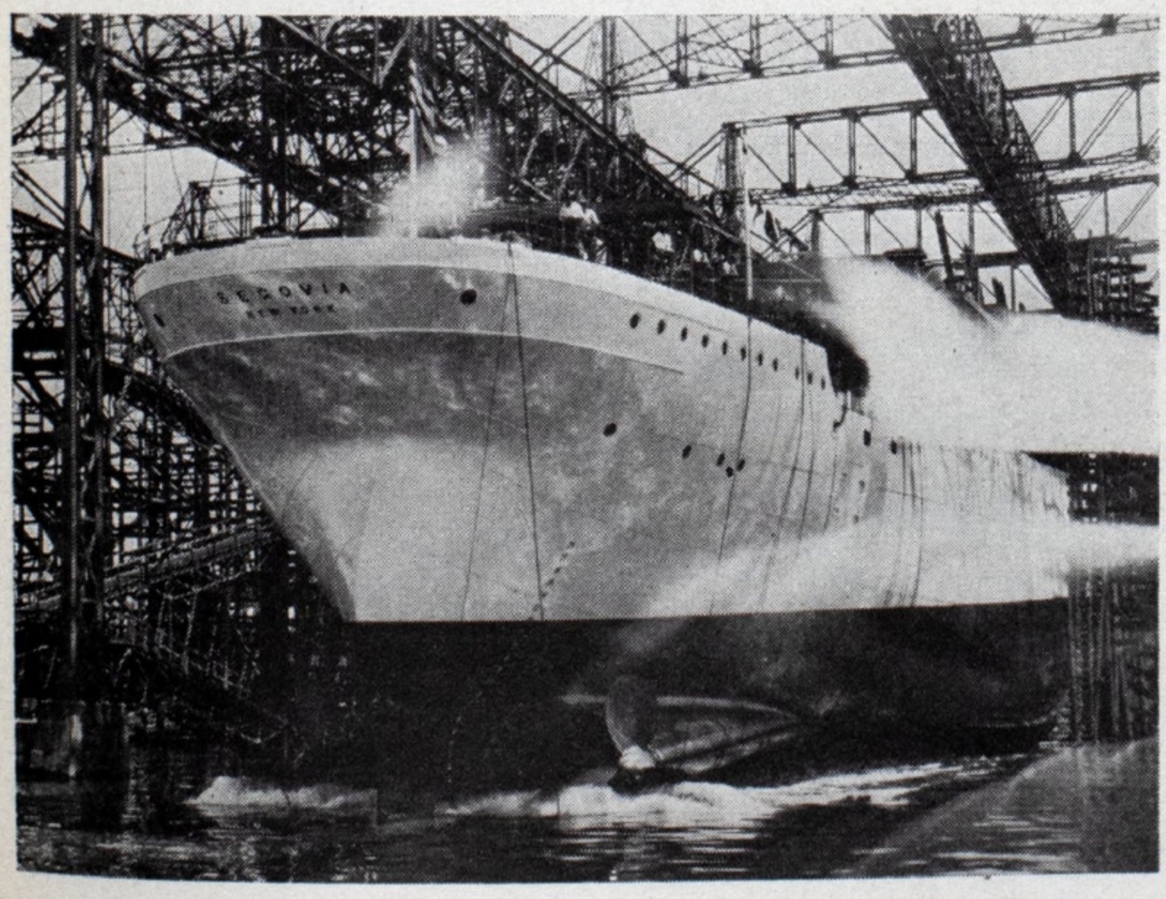
Above—At the Launching of the Segovia and Talamanca at Newport News, Va., Aug. 15. From Left to Right—Homer L. Ferguson, President of the Newport News Shipbuilding & Drydock Co.; Mrs. Herbert Hoover, Sponsor; Victor M. Cutter, President of the United Fruit Co.; Mrs. Homer L. Ferguson; and Capt. Charles Train, U. S. N., White House Naval Aide

The design of all the public spaces, and their appointments and furniture, will be modern Spanish. Another special feature is a permanent outdoor swimming pool.

There are also large promenade spaces, and the forward end of the promenade deck will be enclosed with frameless windows to provided a sheltered promenade. The main dining room, which will accommodate the full passenger list at one time, is conveniently located on the upper deck, and directly connected to it are the galley and pantry spaces which will be equipped with all modern cooking appliances, the majority of which, including the ranges, will be electrically operated.

Twin Screw Electric Propulsion

The propulsive machinery is turbo-electric, with two main turbo-generators and two alternating current propulsion motors of 5250 shaft horsepower each one for each of the two shafts. Steam will be furnished by four oil-burning Babcock & Wilcox water-tube boilers, which operate under forced draft and are fitted with superheaters. The working pressure is 350 pounds and the superheaters will give about 230 degrees superheat. The machinery is capable of developing 10,500 shaft horsepower at 125 revolutions per minute. Main turbines, generators and motors were supplied by the General Electric Co., which firm also supplied the auxiliary electric plant which consists of three 500 kilowatt geared turbine generating sets. This large auxiliary plant is required



The Segovia, one of the three vessels building at Newport News, Va., for the United Mail Steamship Co., Launched simultaneously with her sister ship, the Talamanca, on Aug. 15. Twin screw electric drive Passenger and Freight Vessels

to supply light and power for the many motor-driven auxiliaries in the engine room as well as throughout the ship—the refrigerating machinery, ventilation fans, windlass, capstans and winches are all electrically operated and the steering gear is hydro-electric. The entire power plant is of the most modern type and is expected to show a high standard of economy in fuel consumption.

The vessels are being built under special survey of the American Bureau of Shipping for the highest classification. They will embody all applicable requirements of the international convention, and those of the shipping board, whose loan fund has made their building possible.

At the time of launching the steel structure was practically complete, a good start had been made on the carpenter and joiner work, all deck machinery was on board, and the installation of fittings was well advanced. The boilers and main propelling machinery, as well as all the boiler and engine room auxiliaries, were installed and all piping was well along. It is expected that the TALAMANCA will be completed and delivered before the end of the calendar year and the SEGOVIA will follow shortly thereafter.

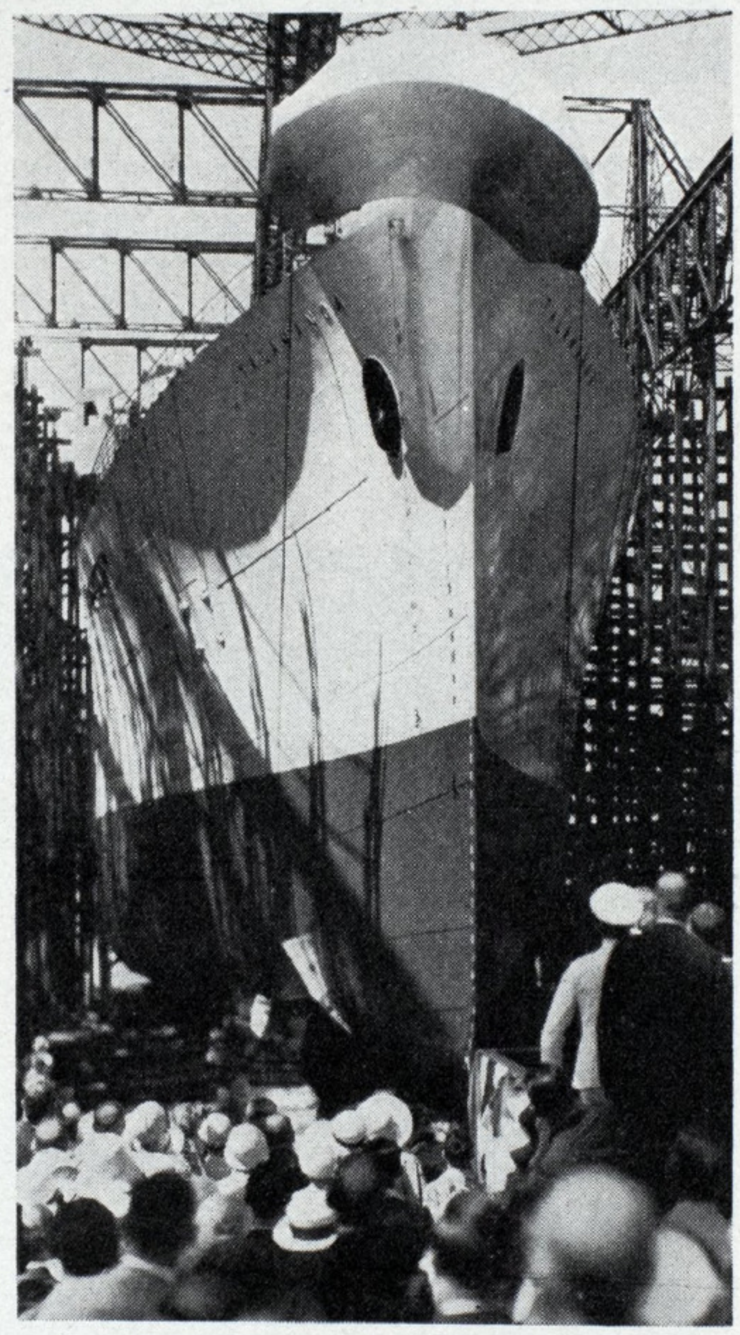
Launching Data Summarized

The vessels were built in the semi-submerged berths from which the fine large Dollar line ships, PRESIDENT HOOVER and PRESIDENT COOLIDGE were launched on Dec 9, 1930 and Feb. 21, 1931, respectively, the former having also been christened by Mrs. Hoover. The groundways used in these launchings which are of a somewhat permanent nature in those berths, were again used, the same grade of about ⅝ inch to 1 foot being retained.

The keels were laid on a ½ inch grade. Temporary ribbands were fitted to the groundways to adjust them to smaller area required for these launchings and permit of the use of 48 inch sliding ways. The packing was 36 inches wide and plate saddles of the usual type were fitted at the fore poppets to carry the latter well forward. Releasing gear of the hydraulic-trigger type was used. The distance slid to pivoting was about 400 feet. In accordance with the builders practice in all ship launchings arrangements and preparations were carefully planned and scheduled. The precision with which each important feature was carried out attests the care that was given to each of the many details involved in the successful carrying through of the launchings.

Plan Fifth Annual Labor Day Lifeboat Race

The fifth annual lifeboat race to be held by the Neptune association, 105 Broad street, New York, will take place on Labor Day, Sept. 7, somewhere in the port of New York, in connection with the association's program of safety of life at sea. Howard E. Jones, president of James W. Elwell & Co., one of America's oldest shipping companies, has been elected chairman of the Neptune Association Lifeboat Race committee and the following were elected members of the committee: Capt. E. F. Mitchell, Hon. T. V. O'Connor, Com. A. B. Randall, Com. H. A. Cunningham, Com. H. Hartley, Com. Wm. H. Todd, Rear Admiral Richard E. Byrd, Captains Theodore Van Beek, J. J. Vander Clute, George Williams, A. M. Moore, J. C. Reichert, R. M. French, Giles Stedman, D. Sullivan, Felix Reisenberg, S. J. Reynard, Lon Yancy, H. Manning, B. Rigoulet; Vincent Astor, C. E. Dunlap, L. Kaine, L. A. French, H. J. W. Fay, Robert L. Hague, and J. F. Milliken.



Talamanca on the Stocks at Newport News, Va., Before Launching

The race will be run over a two mile course in the Bay Ridge channel and several entries have already been made and crews are in training.

The B. F. Sturtevant Co., Hyde Park, Boston, announce the following changes in personnel: Walter L. Hunken has been appointed manager of their Greensboro, N. C., office; Philip Cohen has been appointed acting manager of the Cleveland office and E. A. Engdahl has been appointed manager of the Seattle office. The company manufactures a complete line of fans and blowers for both ventilation and forced and induced draft.

Will Hold Annual Congress In Chicago In October

The twentieth annual congress of the National Safety Council will be held in the Hotel Stevens, Chicago, Oct. 12 to 16 inclusive. The following list of papers is part of the interesting program which has been arranged:

"Safety at Coal and Ore Loading Docks" by E. R. Cott, supervisor of safety, C. & O. Railroad Co.; "Observance of the Rules of the Road for Safety" by Capt. H. T. Parker, port captain, Eastern Steamship Lines; "Importance of Reports and Medical Attention in Minor Injury Cases" by Fern Wood, Moore & McCormack, Inc.; "Bonuses and Penalties in Safety Work" by F. C. Gregory, United States Employees' Compensation Commission; "Safe Operation of Dry Docks" by L. J. Lynn, safety engineer, Newport News Shipbuilding & Dry Dock Co.; "The Fog Horn as an Aid to Navigation" by B. R. Hubbard, director of laboratory, Submarine Signal Co.; "Ship Safety Organization" by A. R. Bush, Westfield, N. J.; "Prevention of Explosions on Motor Ships" by A. M. Tode, The Texas Co.; "Safety Promotion in the Marine Industry" by R. F. Hand, vice president Standard Shipping Co.

Pacific Coast Foreign Traders to Meet

The eighth annual meeting of the Pacific Foreign Trade council will be held in Oakland, Cal. on Sept. 17 and 18. A. F. Haines, vice-president and general manager of the American Mail line, who is president of the council, announces that the program planned will embrace every topic of interest to foreign traders. Currency stabilization as a factor in the development of international trade is to be given a prominent place on the council's program and a discussion of the upward revision of tariffs by the United States and other countries with apparent increasing of prices without additional protection to industry will be a very enlightening part of the program.

Error is Corrected

On Page 29 of the August issue of MARINE REVIEW which was devoted to the propelling machinery of the new steamer PRESIDENT HOOVER, an illustration appeared with the caption "Above, Steam Pumps for Main Feed." This was an error and should have read "Steam Driven Reciprocating Pumps for Lubricating Oil Circulating." The main feed pumps on this vessel are two five-inch three-stage Warren centrifugal pumps with direct connected Terry steam turbines.

Ocean Going Yacht Launched at Maine Shipyard

A NEW ocean-going yacht, the CAROLINE, 270 feet in length, building for Eldridge R. Johnson of Moorestown, N. J., was launched from the Bath Iron Works, Bath, Me., July 18. She will take her place as the largest diesel vessel built in this country since 1926 and the largest yacht launched from an American yard this year.

The new vessel, designed by Henry J. Gielow Inc., is a clipper-stem, white hulled boat with a water line length of 235 feet, a beam of 38 feet and a draft of 15 feet. She carries a pair of 1500-horsepower Cooper-Bessemer diesel engines operating on twin screws to develop a cruising speed of 16 miles an hour.

Accommodations include quarters for a crew of 40 men, rooms for two maids and two valets and seven guest staterooms. The owner's quarters are unusually large and are situated amidship. The single room extends the full beam of the yacht and has a depth of 14 feet 6 inches. Two baths and two wardrobes adjoin.

Aft are the guests' rooms, with all starboard and port quarters connected by 7-foot sliding doors so that any two units may be linked together as veritable apartments. Each room has its private bath and wardrobe.

On the main deck, there is an exceptionally large living room 36 feet wide and 26 feet deep. The forward part has a fireplace flanked by bookshelves and the after end leads out to a semi-sheltered quarter deck. Between the living room and the smoking room is a small lobby leading to a passenger elevator which runs from the owner's quarters, through the main deck to a laboratory on the upper deck.

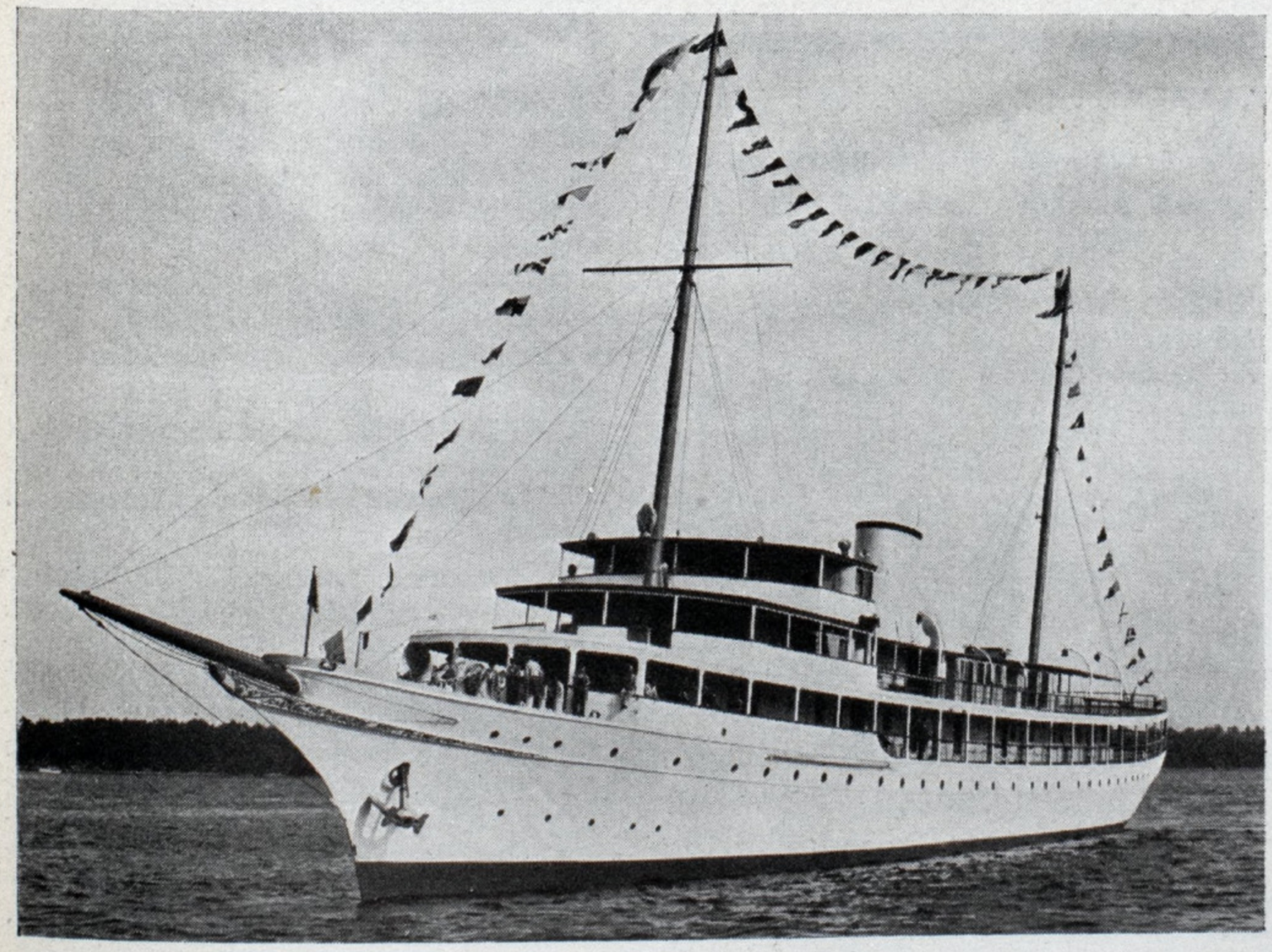
Between the smoking room and the dining saloon there is a dressing and shower room so that the owner's party may change clothes after swimming without going directly to their quarters. Accommodations for the chief engineer also have been arranged on this deck.

The dining room is 29 feet wide and 26 feet deep and connects with a pantry and galley forward. The maids have a private dining room on the starboard side.

On the upper deck is a lounge and observation room. The wireless room is immediately forward, with adjoining quarters for the operators and the captain. A full-view observation room completes the foremost part of the upper deck. On the bridge deck is the chart room and the pilot house.

Deep in the hold of the yacht will be one of the largest stabilizers ever built for a private vessel. It has a rotor 8 feet in diameter and the whole unit weighs 105,000 pounds. The stabilizer was supplied by the Sperry Gyroscope Co. The diesel engines used in the boat weigh more than 300,000 pounds and the whole yacht will be heated, cooled and ventilated by a single thermostatic installation. The boat will carry its own laundry, its own refrigerating plant and will have capacity for enough fuel and oil so that she may cruise 25,000 miles.

Capt. Andrew Peterson, in command of the present 171-foot CAROLINE, will assume command of the new yacht, which will be used this fall for an exploration cruise through southern Pacific waters.



Yacht Caroline—Twin Screw Diesel 3000 H. P. Cooper-Bessemer—279 Feet Long. Launched July 18, at Bath Iron Works Corp., Bath, Me. for Eldridge R. Johnson

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Makes Record Voyage

One of the fastest transatlantic voyages ever made by a private vessel was accomplished in June when the turbine electric yacht CORSAIR, owned by J. P. Morgan, made the run from Newport Reef to Needles, Isle of Wight, in seven days and seven hours for an average speed of 18.35 miles per hour.

The CORSAIR, designed by Henry J. Gielow Inc., and built by the Bath Iron Works, has been in commission slightly more than a year. In that time she has made three crossings from Glen Cove, L. I., to the Thames.

Three All-Water Shipments in Week Set New Record

Two Canadian steamers bringing fine ball and china clays from Cornwall, England, to the Kohler company, and an American motorship carrying finished Kohler enameled and vitreous china plumbing fixtures over an all-water route to the Atlantic coast were docked at Sheboygan, Wis., between July 29 and Aug. 2.

The steamers were the FARRANDOC with a 2550-ton cargo of clays, and the LACHINEDOC, with 2500 tons of clays, both owned by the Paterson Steamships, Ltd., Fort William, Ont., and the motorship EMPIRE STATE, owned by the Federal Motorship Corp., Buffalo. The shipments of finished ware carried by the EMPIRE STATE were destined for the Kohler company's Long Island City, N. Y., warehouse.

While the Kohler company has been importing clays by the all-water route from England for more than three years and within three months had sent two previous motorship cargoes by water to New York, it was the first time that three shipments were made during a single week.

The ocean-going steamer DUNAFF HEAD carried the clays across the Atlantic and up the St. Lawrence river to Sorel, Que., where it was reloaded into the FARRANDOC and LACHINEDOC.

The EMPIRE STATE, which initiated the motorship service for the Kohler company last May, requires approximately nine days to journey through the Great Lakes, the Welland canal, the New York state barge canal and the Hudson river.

The Kohler company is one of the earliest shippers in the Middle West to take advantage of the new Welland canal, both for importing raw materials and for sending finished products to the eastern coast.

Passenger Trade on North Atlantic

Creating a Desire for Sea Travel by Short Cruises—Advent of Empress of Britain a Challenge to New York

By W. L. Harms

ESPECIALLY in the sphere of shipping do new principles, improvements, and fashions follow close upon one another nowadays.

In recent numbers of MARINE REVIEW, in sketching the rise of the great North Atlantic passenger traffic, an attempt has been made to set forth the more important developments that have arisen to the present time in that trade.

Hardly was the narrative presented in print when there asserted themselves two new influences which had quietly been gathering headway during the past two years, influences that clearly constitute threads of the story as significant probably as any of those of the past.

For the one we have to consider that suddenly popularized week-end cruise; for the other an attempt at an appraisal of the effect on transatlantic passenger travel by the advent of the EMPRESS OF BRITAIN.

In 1929 and 1930 the miniature sports midget golf, table tennis, etc.; in 1931 the miniature cruises!

The idea of pleasure cruises on ocean liners appears to have been put into practice for the first time early in the 1890's, when the Hamburg-American line gave it a trial with one of its greyhounds, the AUGUSTA VICTORIA. The plan later gained a certain amount of favor among the other steamship companies also.

Beginning of the Pleasure Cruise

However, it was really after the Great war that the pleasure cruise became the important department in the activities of the Atlantic steamship lines that it now is. Along with cruises to Mediterranean lands, to South Africa, to South America, to the West Indies, and to Scandinavian shores, the post-war convenience of the Panama canal has rendered practicable a number of around-the-world cruises annually.

The principle of these cruises, from the standpoint of ship operation, has been that they served to keep the big passenger liners employed in the off-seasons of transatlantic travel. Actual profits were not looked for in cruises; yet, what revenues they could earn against the cost of such operation, figured at less of a loss than to lay them up altogether, in idleness but yet at overhead expense.

In 1929 and 1930 the miniature sports cruise has risen from the humble status of a lesser evil to the rank of a real field of operations for the Atlantic lines. The Hamburg-American Co. itself had recognized possibilities in it years before the War. Besides having assigned several smaller vessels to cruising service as their definite province, the company in 1910-11 had caused its famous record breaker, the DEUTSCHLAND, then obsolescent, to be remodeled into a specialized cruising steamer, renaming her VICTORIA LUISE.

Vessels Rebuilt Especially for Cruises

Following the War, in finally completing, in 1923, the somewhat delayed steamship FRANCONIA, a proud vessel of 20,000 tons, the Cunard company found it worth while to fit her with special regard for cruising duty, though primarily the ship remained a standard liner. Further circumstances have led the Hamburg-American line now to classify the well-known RESOLUTE and RELIANCE, of similar tonnage, as cruising steamers; their transatlantic voyages in regular liner service indeed now seem to be considered rather a sideline for this pair.

Still, it remains a question whether the cruising business, for a transatlantic shipping line in general, is a source of profit even now. While it is reasonable to suppose that liners of moderate speed and therefore of not extraordinary operating cost may show some fair returns, it is obvious that in such leisurely occupation high-powered express steamships like the MAURETANIA, COLUMBUS, HOMERIC, and FRANCE are not to be expected to do more than break even at the best.

So far we have been considering the usual types of pleasure cruise, ranging in length from several weeks to several months.

Cruises of shorter duration, taking up just a week or two, have long been offered also, by shipping lines operating in services of a coastwise nature. The vessels here concerned, of course do not approach ocean carriers in scale of design, there being no place normally in such trades for very large units.

Some of the Atlantic lines have in the past likewise conducted short cruises at the European end. But at the New York terminus about the first offerings of this sort by a transatlantic company have been those vacation trips to Nova Scotia afforded by the Anchor line in the summer of 1929 with the steamers CALEDONIA, TRANSYLVANIA, and CALIFORNIA.

Origin of the Shorter Cruise

In the early part of the present year a still more abbreviated variety of pleasure cruise has suddenly sprung into popularity—the summer week-end cruise; into such popularity indeed that it has come to rival the standard off-season cruise in departmental, importance. Not the least interesting feature of this latest idea is that it emphatically involves the superliner class of steamship, meaning units of 40,000 tons and over, which previously have not been concerned with pleasure cruises.

These week-end cruises fit so nicely into the schedules of the steamship companies on the one hand and into the week-ends and pocketbooks of pleasure seekers on the other that it is curious, and a bit aggravating, that the thing has not been experimented with long ago.

In contrast to cruises of longer duration the week-end cruises are conducted right in the busy summer season, but without interrupting to any extent the regular transatlantic schedules of the liners employed. This is effected simply by introducing the cruises into the several days representing the "turn-around" of the steamer at New York, between her arrival from Europe and her departure again for the return trip.

In the case of express steamships this

WE now have the week end cruise of transatlantic liners to tap a virgin source of patronage. Will it have a permanent effect in increasing more extended sea travel?

¶ A new liner of great size and speed, crossing the Atlantic from land to land in 3½ days, with Montreal as a terminal, threatens the isolated supremacy of New York as a port of departure and entry to the North American continent.

¶ Shipping is seething with progress and the plans for our own superliners are gathering dust.

Editor's Note

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turn-around period amounts to about four days, although the busy BREMEN and EUROPA do operate on a considerably narrower margin; for other ships, of lesser types, it comes to five days or more. Accordingly it is usually possible to sandwich into the turn-around period a 3½-day cruise to Nova Scotia or to Bermuda. To manage it, however, it must be admitted that the energies of the ship and pier organizations are taxed to their utmost capacity with nothing to spare.

Popularizing Week End Trips

From the viewpoint of the patron the plan is similarly a convenient one. Three-day week-end trips to the conventional summer resorts are no unusual thing for the average person. To devote at least one such week-end to a miniature cruise at sea, on one of the famous supersteamships, is a choice bit of variety that is sure to become increasingly popular.

The beautiful part of it is that it is possible for one to enjoy such a cruise at a cost comparing favorably with that of a normal week-end trip to a summer resort. Varying naturally according to type of accommodation, rates are being quoted by the steamship lines at from as little as $35 up. Why, even the office boy can afford a cruise at sea on the biggest ship afloat.

Two considerations have combined to bring about the institution of these week-end cruises.

For one thing, there is the matter of adding to a ship's earnings in thus utilizing her scheduled turn-around period. While it is true that an express liner in particular will have to forego the chance of freight revenue, due to lack of opportunity to discharge incoming cargo and load out-going cargo in its place, there will be incurred perhaps no actual loss in this connection. First of all, a greyhound is not supposed to carry much cargo anyway; secondly, the summer is naturally a quiet season for transatlantic cargo movement; thirdly, this year of 1931 especially will hardly be productive of very much in the way of cargo offerings for an express steamer.

What has been stated, however, as the chief reason for these miniature cruises is the expectation that there will be attracted to them many patrons that would not ordinarily think of making an ocean voyage, but, having once experienced such a sample, might become enthusiastic enough to contemplate later ocean trips of a more extensive character.

So. like the tourist third cabin idea, the week-end cruise represents an effort on the part of the steamship lines to uncover new sources of patronage, indeed to arouse interest in overseas travel among such potential voyagers as even tourist third cabin has yet failed to tempt.

As to that second big development of the current year, it might be reasoned at first thought that, while the EMPRESS OF BRITAIN is truly a wonderful ship, she is after all just another superliner, which in itself would not be quite enough to qualify her as a "herald of a new era."

But it must be remembered that we have here a 24-knot liner on the St. Lawrence route!

For the last fifty years or so New York has been the big gateway to North America, to which most of the large Atlantic liners practically all the greyhounds, have plied. If all roads have led to Rome, all superliners have run to New York.

In 1881 there was placed in service between Liverpool and the St. Lawrence ports the Allan liner PARISIAN, which in speed, as also in size, ranked with the leading steamers on the New York run. But thereafter the St. Lawrence was decidedly outdistanced by New York in the matter of express steamers. While the PARISIAN remained the crack liner on the Canadian run for a number of years, the New York route was graced by ships of increasing size and speed—the CITY OF ROME, ALASKA, SERVIA, AURANIA, OREGON, AMERICA, UMBRIA, ETRURIA, CITY OF NEW YORK, CITY OF PARIS, TEUTONIC, MAJESTIC, CAMPANIA, and LUCANIA, together with a score of German, French, and American greyhounds of hardly lesser rating.

In the first decade of the present century the St. Lawrence trade rose to the dignity of a pair of 15,000-ton 18-knot steamships—the first EMPRESS OF BRITAIN (latterly MONTROYAL) and the unfortunate EMPRESS OF IRELAND. This was not to be considered close rivalry with New York however, the latter port now being served by such ships as the KAISER WILHELM DER GROSSE, OCEANIC, DEUTSCHLAND, KRONPRINZ WILHELM, and KAISER WILHELM II., of up to 23 knots, together with those big intermediate liners of up to 25,000 tons.

On the eve of the Great war another handsome pair entered the St. Lawrence traffic, of 18,000 tons and 19 knots, these being the ALSATIAN, now known as the EMPRESS OF FRANCE, and the CALGARIAN, subsequently lost in the War. By this time New York had its LUSITANIA'S, OLYMPIC'S, and IMPERATOR'S, of up to 54,000 tons and 26 knots.

Following the war, down to the current year, the EMPRESS OF FRANCE has remained about the swiftest of the Atlantic liners to Canada, although several later units have raised the tonnage mark to 25,000 tons.

So far, then, attracting as it has by far the greater proportion of transatlantic traffic, New York has been enjoying almost a monopoly of the express passenger and mail movement across the Western ocean.

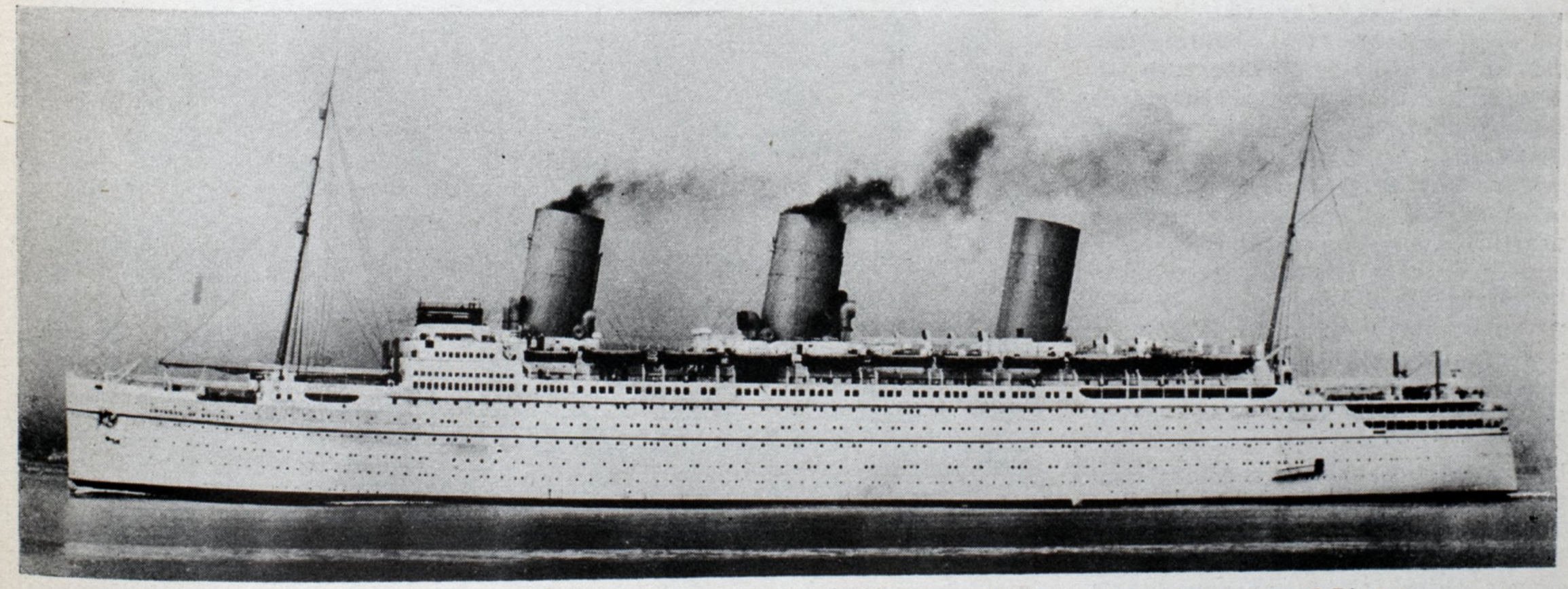
Now, in the year 1931, the St. Lawrence has been exalted with its first superliner, a ship of 42,000 tons and 24 knots or better.

The New Empress a Challenge

While due attention has been accorded the news that Canada is henceforth to be served directly by a liner of rare magnificence, it does not seem to be realized generally as yet that the new EMPRESS OF BRITAIN represents, not merely another new ship, but a threat to its trade supremacy such as New York has not experienced for a half a century.

For the first time since the PARISIAN the St. Lawrence ports can boast a

(*Continued on Page* 54)



Empress of Britain—In Magnificence and Speed, a Worthy Rival of the Finest New York Bound Liners

THE MARINE DIESEL

What are its Chance

An Impartial Analys

By D. M. Shannon,

COMPETITION in shipping depends on several factors. One of the most important of these is economical power. It is therefore urgent for every shipowner, naval architect and engineer to keep imformed on the trend in types of power for ships. Statistics show that the European shipowner is more favorable to the diesel drive than is the American operator. In order to get at the real significance of this condition and to give a true and impartial appraisal of the standing of diesel power in European shipping, Marine Review has commissioned a British authority on the subject to give the facts as he sees them and the accompanying article is the result. This article is presented with the hope that it will give our readers a clearer conception of the actual status of the marine diesel engine at the present time.

Editor's Note

A NEW development generally owes most of its progress to the stagnation of existing methods brought on by lack of competition rather than to its own inherent advantages, a fact that has been recently established by the relative advances during the last few years in the economy of steam and motor vessels. The former has definitely improved its position to such an extent that the prophesies of ten years ago have been completely falsified and instead of reading its epitaph we are today watching an old rejuvenated rival holding its own in the most important race for supremacy that has taken place since the oil engine threw out the challenge.

The introduction and establishment of the oil engine for marine propulsion appears to have been a matter of very little difficulty. At its birth it had nothing to compete with but comparatively out of date reciprocating engines with low pressure coal fired boilers consuming on an average more than 2 pounds of fuel per horsepower. The few turbine ships were just as wasteful and the use of oil for steam raising was in its infancy and much too costly for all but the highest class of passenger ships. High pressures and high superheats although making considerable progress on land were comparatively unknown or looked on with disfavour by most marine engineers. It is on record that the best use one firm could find for the superheater tubes after having discarded them was to make a fence for keeping sheep off the banana plantations.

When therefore, the oil engine appeared consuming no more than one-quarter of the weight of fuel, its enormous advantages were at once apparent. From the owners point of view much time was saved in fuelling the vessel and it could make long trips without having to go out of its way to bunker and in many cases could select the cheapest zones for oil. The dirt and discomfort of coal and ashes were eliminated, the oil simply disappearing after being put on board. It could also be stored in useless and out of the way spaces, and so add to the passenger and cargo carrying capacity. Fuel is not only a non-paying cargo but costs fuel to carry it about and any reduction that can be made is cumulative in its savings.

The reduced engine room staff also brought about savings in wages, ra-

THE writer has endeavored to detach himself from the fact that he is a 100 per cent oil engine man, having been in the profession from the very inception of the marine internal combustion engine of the ocean going type, and he cannot therefore be accused of unduly favoring the steam engine. Above 10,000 brake horsepower the oil engine is waging and it will continue to wage a losing battle unless some great advance can be made of which, there is as yet, not the slightest indication. The steam engine is just entering on a new phase of progress, which if carried on unchecked can only end in complete victory. In the short space of five years we have seen the favorite drop into second place and it is even threatened with extinction for all but moderate powers and certain special

Birmania, One of Four for Venetian Company. With One 6000 *B. H. P. Fiat Engine*

ENGINE IN EUROPE

Against Improved Steam

of its Present Position

M. E., M. I. N. A.

THE author of this article, D. M. Shannon, has been identified with oil engine design for 25 years. He designed and built the first direct reversing heavy oil engine of British origin at William Beardmore's, Dalmuir in 1912. For two years he was technical advisor and oil engine expert at the Fairfield Shipbuilding & Engineering Co., Ltd., during which time he spent six months with the M.A.N. company. The next three years he was in the submarine department of Vickers Ltd.; and then for eleven years he was chief engineer of the oil engine department of Cammell Laird's. For the next five years he was British manager of Fiat's heavy oil engine section, and is now consulting engineer in London. Mr. Shannon is a member of both the Institute of Mechanical Engineers and the Institution of Naval Architects.
Editor's Note

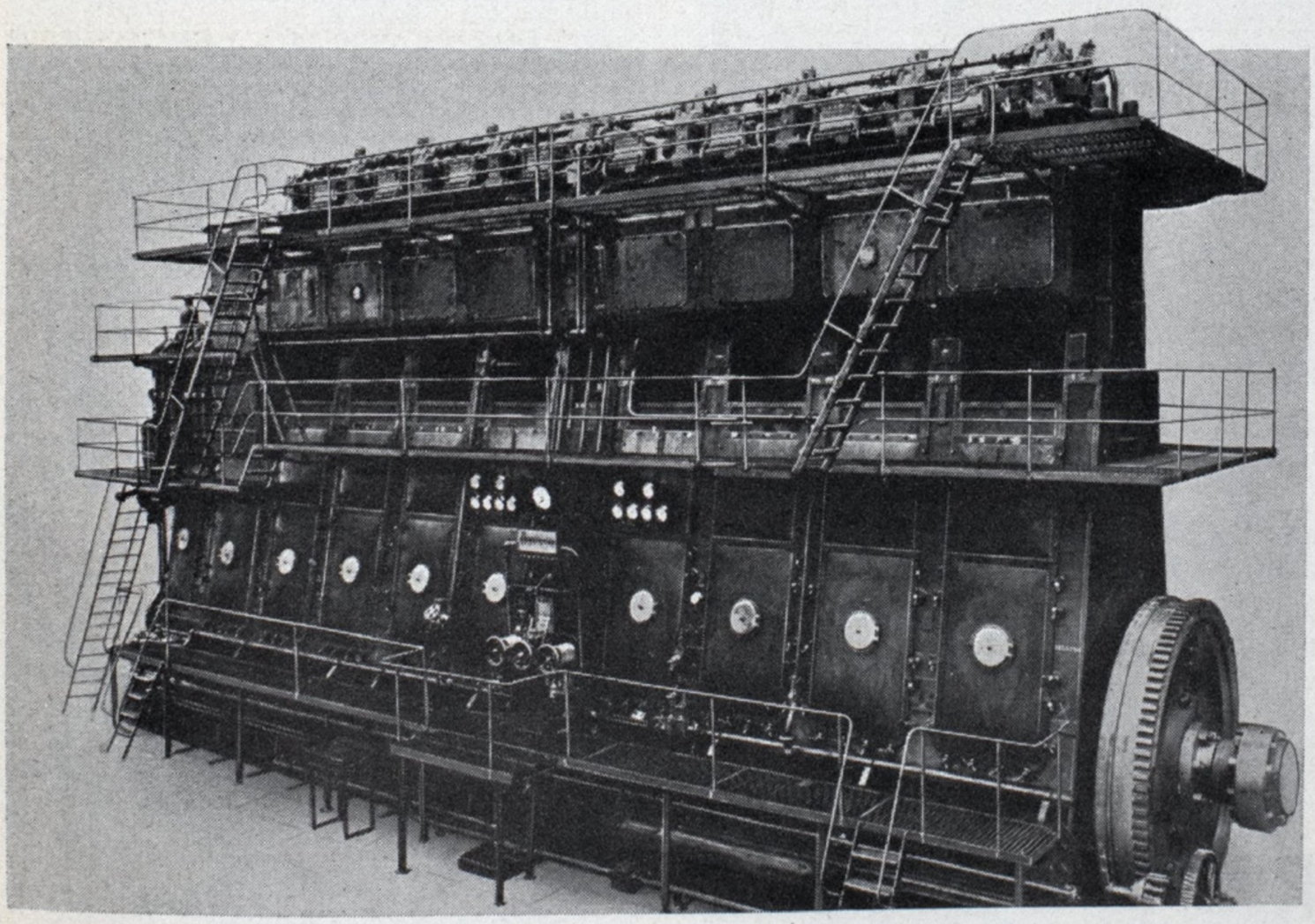
applications. For powers ranging from 10,000 brake horsepower downward, the oil engine at present still holds a prominent position.

Finally, attention should be called to the misuse of the name Diesel. Akroyd Stuart had a cold-starting compressorless engine running in England about two years before Diesel took out his patent. Dr. Diesel himself was not the inventor of combustion by high compression, and there is nothing on record to show that he made any such claim. No one will deny that it was mainly due to Diesel's work that the oil engine gained such prominence, but his name can only be associated with air injection engines. As soon as the compressor is eliminated, it is no longer a Diesel engine, and airless injection is now common.

tions and living accommodation and there was no danger of the ship being held up by desertion of the lower ratings. For cross channel and other services where the actual running time is insignificant, stand-by losses are almost entirely eliminated and large economies effected.

There were also great advantages from the operating engineers point of view. He could maintain a constant speed since there were no boilers to fall off in steaming efficiency due to choking up with ash. The troublesome stokers were eliminated and he had the whole of the propelling machinery directly under his eye. There was no tedious preliminary warming up and getting up steam that generally required some twelve hours, and after making port he could be off duty in a few minutes. Oil fired boilers have of course, brought many of these conveniences to the steam engineers but only in the case of vessels of large power so that for the bulk of tonnage, the oil engine still enjoys an enviable position.

Despite the fact that the first cost of the motor vessel was undoubtedly higher than steam tonnage it was able to show improved operating results and dividend earning capacity, and was almost exclusively adopted by several large ship owning concerns. Their success was primarily due to the careful selection of the engine room staff and there are cases on record where the same make of engine has given such widely differing results in different fleets as to cause its further adoption in one fleet and its abandonment in another.



Largest Fiat, 6000 B. H. P. Four to Go in Cosulich Liner Now Building

At one period, about 1923, of its career it was thought it would oust steam completely, a thought that was strengthened by the large number of first class vessels that lay crippled all over the world due to failures of their double reduction geared turbines which were being rapidly introduced in an endeavor to meet the devastating attack of the oil engine. In one year no less than eighty could be counted and the result was reflected in the increased activity at the oil engine building establishments, and the rush of large marine engineering firms to take out manufacturing licenses for well-known makes of oil engines.

Fuel economy played a more important part in the progress of the oil engine than increased carrying capacity. The former is a very definite saving that goes on for the life

of the ship. Extra capacity is a more doubtful advantage since it cannot always be made use of, because it is very seldom that either passenger or cargo ships have a full complement. Weight of machinery is not of paramount importance and is in any case, about equal for all types for similar duties. Fuel and maintenance costs are recurring expenditures and play a most important part in the choice of the propelling equipment, and largely determine the dividend earning capacity of the ship as a whole.

The Fuel Problem

IN ORDER to appreciate the fuel problem and forecast the future with some degree of reliability, it is advisable to become retrospective and examine some of the factors that caused the rapid introduction of the oil engine.

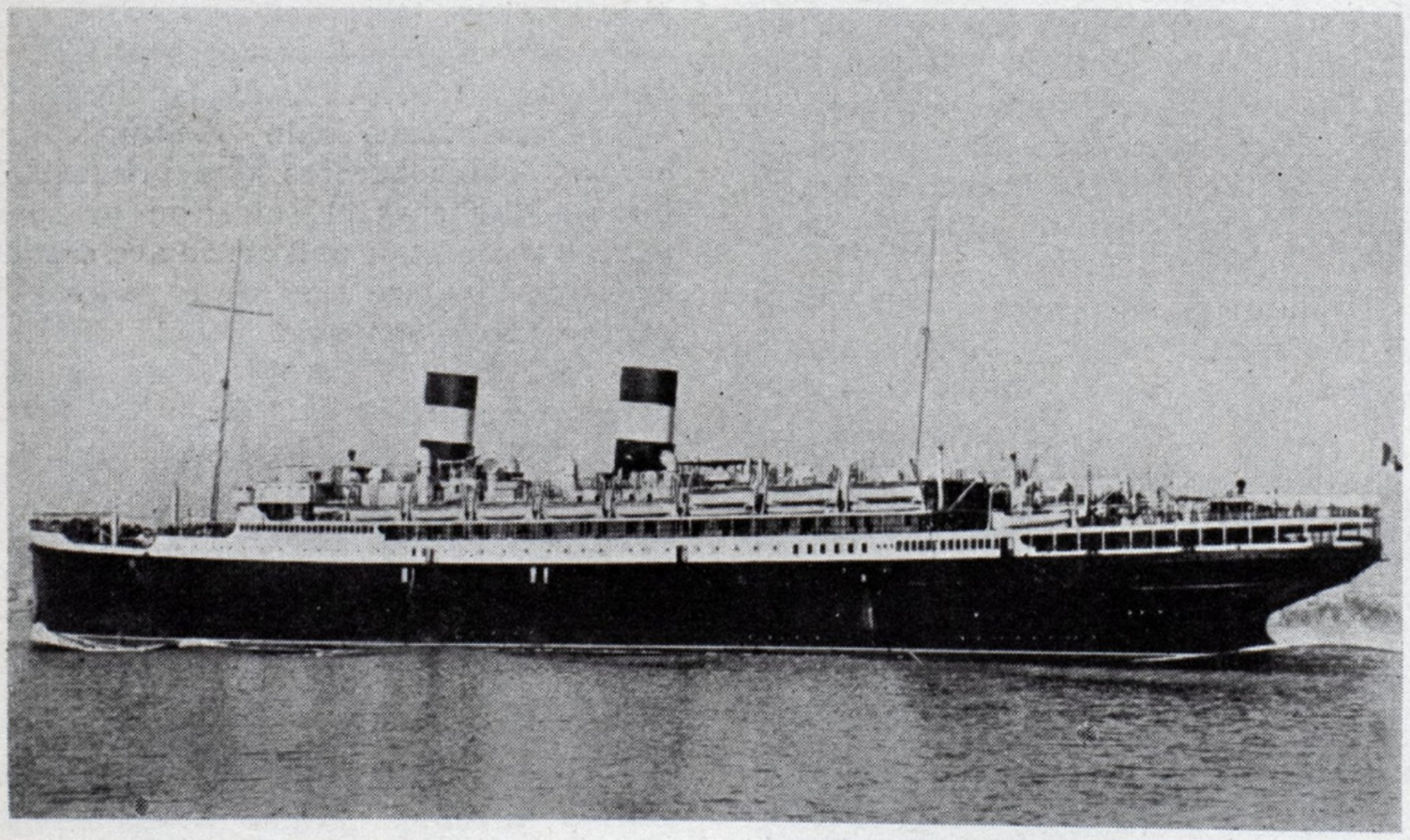
In 1890 the oil engine was slightly inferior in economy to the steam engine because it was of the low compression vaporising type. The following ten years witnessed the introduction and perfection of the high compression cold starting type so that by 1900 it had trebled its economy to become twice as efficient as the steam engine. No later than ten years ago, the oil engine as already stated, consumed about one-quarter the weight of fuel required by coal burning steamships.

A simple calculation showed that at the then ruling prices of oil and coal the motorship could save the entire cost of its propelling machinery in the course of three or four years. This applied to the normal range of cargo vessels of about 8000 to 10,000 tons since the oil engine had not at that date, been developed in sizes to enable them to be applied to fast passenger vessels such as might be used on cross Atlantic routes.

The oil engine then became first favorite and would have made even more rapid progress but for the fear that the increased demand for oil would send its price up or cause a shortage. The price did go up until its advantage in fuel costs was almost wiped out, but it still maintained its popularity due to its other attributes, and to the fact that it was now firmly established as a reliable propelling plant.

At the present moment the reciprocating steam engine has further improved its position by the adoption of special valve gears and an auxiliary turbine geared to the propeller shaft to utilize the exhaust steam, so that the determining factor in the choice of propelling plant is now no longer one of fuel consumption so far as vessels of the above size, namely, up to 10,000 tons, are concerned. It is impossible to accurately analyse the reasons underlying any particular preference since they are so often merely a matter of use and want, vested interests or associations. In some cases shipowners have been so badly bitten by the choice of the wrong type of oil engine both for propelling and auxiliary purposes that they are glad to adhere to steam even at the expense of efficiency.

It may be taken for granted that coal producing countries will always build a large proportion of steam tonnage until such times as coal can be converted into oil on a commercial basis, but by that time the steam engine may have improved in efficiency to such an extent as to maintain its existence as an active competitor, a statement that is supported by the present trend of events that will now be referred to at some length.



Motorship AUGUSTUS *of the Navigazone Generale Italiana. Built* 1927, *of* 32,650 *Gross Tons. World's Biggest Motor Liner*

Economy of High Pressure Steam

RECENT developments in high pressure and high temperature steam plants must cause the most enthusiastic oil engine experts much concern, and it is well that the facts should be looked squarely and honestly in the face. At the moment the immediate danger to the eclipse of the internal combustion engine as the world's most efficient propelling unit comes from steamships requiring something on the order of 40,000 shaft horsepower. For such powers it is possible to incorporate all the refinements and fuel saving devices of the biggest land power plants, but there are no theoretical or mechanical reasons why the power cannot be progressively decreased until the requirements of the average tramp steamer are met and then the oil engine will be faced with severe competition in all but the smallest powers.

The recent rapid progress made by the steam engine is well illustrated by the remarkable results achieved by John Johnson, superintendent engineer of the Canadian Pacific Steamship Co. The EMPRESS OF AUSTRALIA was re-engined in 1927, and gave an "all-in" fuel consumption of .71 pound per shaft horsepower. The DUCHESS class gave .625 pound, the EMPRESS OF JAPAN .603 pound, and the latest one just out this year, the EMPRESS OF BRITAIN, achieved the wonderful figure of .57 pound. This represents a reduction of 20 per cent in the short space of approximately four years.

This has been attained with a pressure of 400-500 pounds which, judged by our modern conception of the problem, is very moderate, and is less than the pressure developed by the high efficiency oil engine. At 900 pounds pressure a fuel consumption of .5 pound can be guaranteed and as the limit is only reached at the critical pressure of 3000 pounds, it must be obvious to any

World Motor Vessels

IN October, 1930, there were, according to the Bureau Veritas, 3840 motor vessels and vessels fitted with auxiliary motors of 7,486,000 gross tons, including 800 British vessels of 2,291,000 gross tons and 495 American vessels of 672,000 gross tons. Germany owned 431 vessels of 584,000 gross tons, and the three Scandinavian countries 763 vessels of 1,914,000 gross tons, of which 331 vessels of 1,056,000 gross tons were Norwegian.

As compared with October, 1929, this is an increase of 1,238,000 gross tons. The percentages by number and tonnage are given below:-

	Per cent	
	By number	**By tonnage**
British	20.8	30.6
American	12.9	9.0
German	11.2	7.8
Scandinavian	19.9	25.6
Other flags	35.2	27.0

World Merchant Vessels Under Construction

December 31, 1930
(Vessels of 100 tons gross and up)

	No.	**Gross tons**	**Percentage**
Motor	252	1,332,709	57.29
Steam	232	984,034	42.30
Sail and barges	18	9,343	0.40
	502	2,326,086	100.00
Oil tankers of 1,000 gross tons and up included in the above	115	907,298	39.01

(Lloyd's Shipbuilding Returns)

engineer that fuel consumptions equal to those of the best oil engines are within sight. Already there are experimental boilers working at this critical pressure and it should not be long until they can be introduced into everyday marine engineering practice. This is all very disturbing to the oil engine designer who can take a detached view of the present situation and the probable future, and if he cares to lull himself to sleep he may be awakened with a greater shock than he administered to the steam engineer little more than ten years ago when his attack was at its height.

Using High Pressure Steam

IT MUST be admitted that high pressures have brought many difficult problems to solve. In an oil engine the metals are only subjected to high pressures and temperatures in a periodic manner. At each cycle they get a rest, otherwise continuous steady operation would be impossible, since lubrication would break down. In the case of high pressure steam the materials must be able to resist the continuous application of high heats and stresses. It may be assumed that for pressures in the neighborhood of 400 pounds, the problem of suitable metals has been overcome since higher pressures are now being considered.

It may also be taken for granted that maintenance charges will be higher, but unfortunately no definite comparative figures are available for publication. This may be due to the recent date of the development or to a studied silence on the part of the owners. There have been rumors of high upkeep costs but it is difficult to associate these with the bold policy of placing a liner valued in millions of pounds at the mercy of uncertain machinery. The task of re-boilering would be so colossal and expensive as to rule out all the elements of a gamble. The effect of an explosion would be disastrous, not only to life but to the bookings as well, so that we are forced to the conclusion that the present practice of advancing steam pressures and temperatures by cautious increments is both a safe and a paying practice.

It may be stated that in view of the advances that have been made in all departments of metallurgy, ultimate success will lie with the plant in which the hot gases are not brought into contact with lubricated surfaces. This is accomplished by the turbine in the case of steam plants, but all attempts at introducing the internal combustion turbine have completely failed, and today this problem may be considered as elusive as when first seriously tackled.

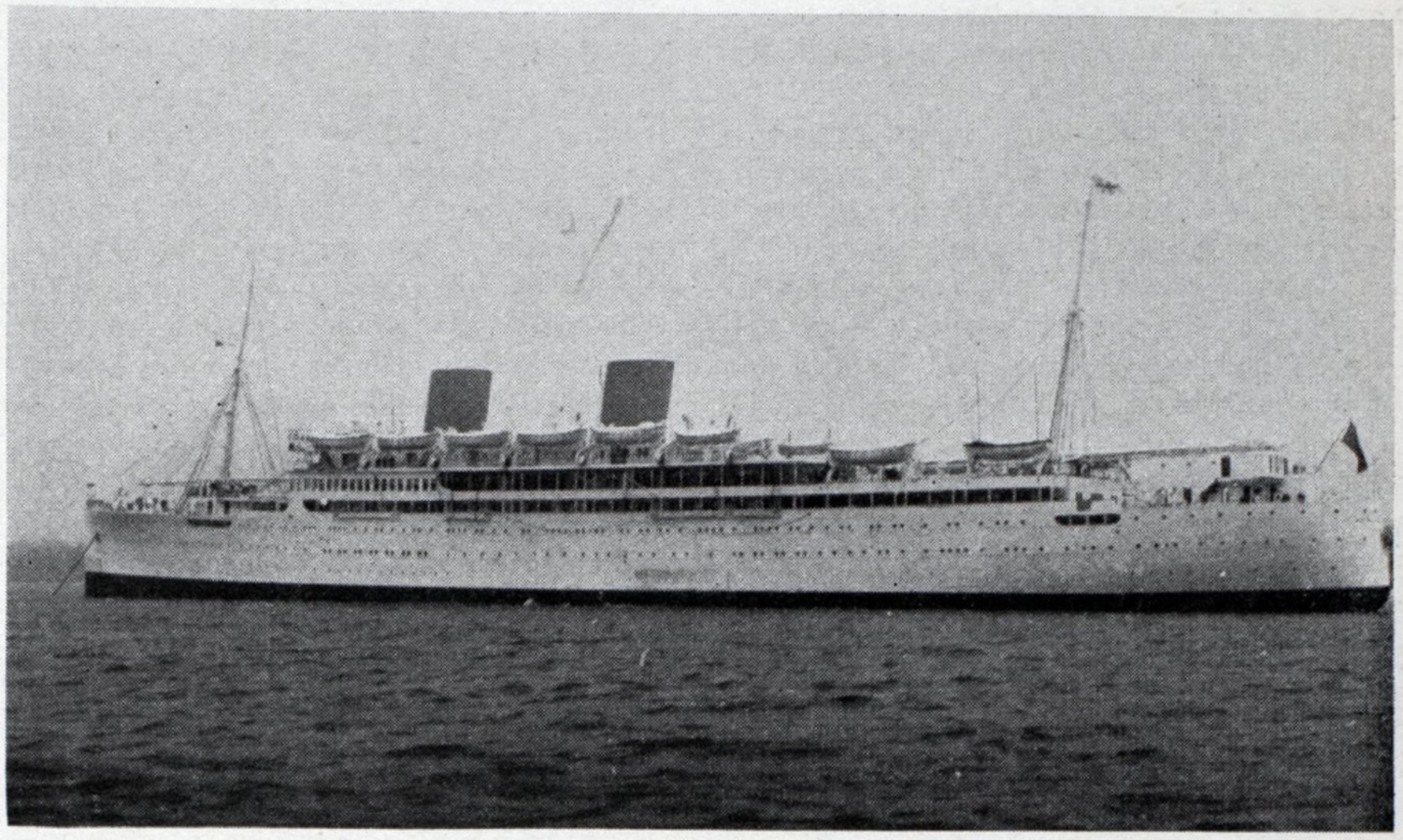
Oil Engine Efficiency

AS REGARDS vessels requiring 2000 to 3000 brake horsepower, the present position has not materially altered, the coal fired vessel still requiring about three times the weight of fuel necessary for the motorship, so that excepting for special cases the oil engine is supreme, but how long this position can be maintained will be due entirely to the possible application of high pressure steam for the smaller powers.

At the moment the oil engine with a favorable fuel consumption of about .37 to .4 pound, has just about reached the highest efficiency that theory indicates to be the limit of the cycle. Pressures can be increased with a corresponding increase in efficiency, but not to the same extent that is possible with the steam engine. Particularly in the case of large engines, materials, lubrication and design are the limiting factors and the present maximum pressures of 500 to 600 pounds cannot be greatly exceeded.

The problem of liner and piston ring wear, although satisfactory is still subject to improvement and any raising of the working pressures would only result in aggravating the troubles and increase the maintenance charges. There is also the possibility that any calculated gain in efficiency would be neutralized by losses due to piston leakage, and ring and other frictional losses, and it is impossible to say how far the pressure could be increased before mechanical limitations would call a halt. Too much hope, therefore, cannot be placed on any direct improvement of the cycle by known methods, but there is still scope for recovering the heat lost in the cooling water and rejected in the exhaust gases, but all attempts have only resulted in infinitesimal gains that are insufficient to materially improve the position as a whole.

There is also the loss due to exhausting at the terminal pressure of some 30 pounds per square inch, the recovery of which would offer hope of improving the fuel consumption. At present the only use that has been found for this pressure drop is for driving turbo blowers for supercharging, as in the Buchi system, but while the output of the engine can be increased by anything up to 50 per cent, the fuel consumption remains unaltered. No serious attempts have been made to apply this principle to the two stroke engine since it is not so readily adaptable to this treatment as the four stroke engine. Some of the difficulties due to the elevation of the pressure and temperature range might be minimized by compounding but there would still remain the serious disadvantage of a white hot flame in contact with lubri-



Reina del Pacifico, Built by Harland & Wolff, 1931. Of 17,707 Gross Tons, Quadruple Screw Motorship. Europe to South America Run

World Merchant Tonnage(a)

June 30, 1919-1930
(100 gross tons and upwards)

	Steam(x) Gross tons	Motor(x) Gross tons
1919-20	47,144,801	752,606
1920-21	52,948,878	955,810
1921-22	57,597,525	1,248,800
1922-23	59,800,792	1,542,160
1923-24	60,668,988	1,666,385
1924-25	59,538,342	1,975,798
1925-26	59,666,303	2,714,073
1926-27	59,178,653	3,493,284
1927-28	58,996,478	4,270,824
1928-29	59,727,111	5,432,302
1929-30	59,779,291	6,628,102
1930-31	59,927,467	8,096,337

(a) Recorded in Lloyd's Register for the years stated.
(x) Including sailing vessels fitted with auxiliary steam and motor engines.

Motorships of Each Nation

(As of October, 1930)

Country	Number	Gross tonnage
British Empire	800	2,291,389
Norway	331	1,056,370
United States	495	671,838
Germany	431	584,402
Sweden	268	506,792
Italy	190	495,994
Holland	345	442,046
Denmark	164	350,377
Japan	226	340,909
France	89	136,059
Spain	103	126,240
Russia	43	113,497
Danzig	13	106,052
Belgium	19	57,291
Brazil	31	53,970
Panama	11	34,371
Argentine	49	30,171
Finland	61	18,624
Other countries	171	69,930
	3,840	7,486,322

(Bureau Veritas, Repertoire General)

cated surfaces, a disadvantage from which the steam turbine is entirely immune.

Compounding the Diesel Engine

IN THE case of the gas engine attempts carried out some 20 years ago at compounding failed, and there are no new developments that would lead us to assume that it would meet with any success if applied to the heavy oil engine of today. In his original treatise Diesel spoke of pressures such as are developed in guns but it did not take much experimental work to demonstrate that the moderate pressures now in use were all that could be economically employed, a limitation that was dictated by the purely mechanical reasons already stated.

As far back as 1912 a laboratory engine was in existence giving a fuel consumption of about .38 pound per brake horsepower per hour, which is approximately better than that realized by the majority of large engines now in operation. It is, however, becoming more common in both large and small engines but the fact stands out that all the oil engine designer has been able to accomplish in nearly twenty years of effort has been to commercialize this laboratory achievement. Another noteworthy and disconcerting feature is that the fuel consumption does not improve with increase in dimensions, the reverse being more often the case. There are engines of 10 brake horsepower per cylinder giving as good results as many of 1000 brake horsepower per cylinder.

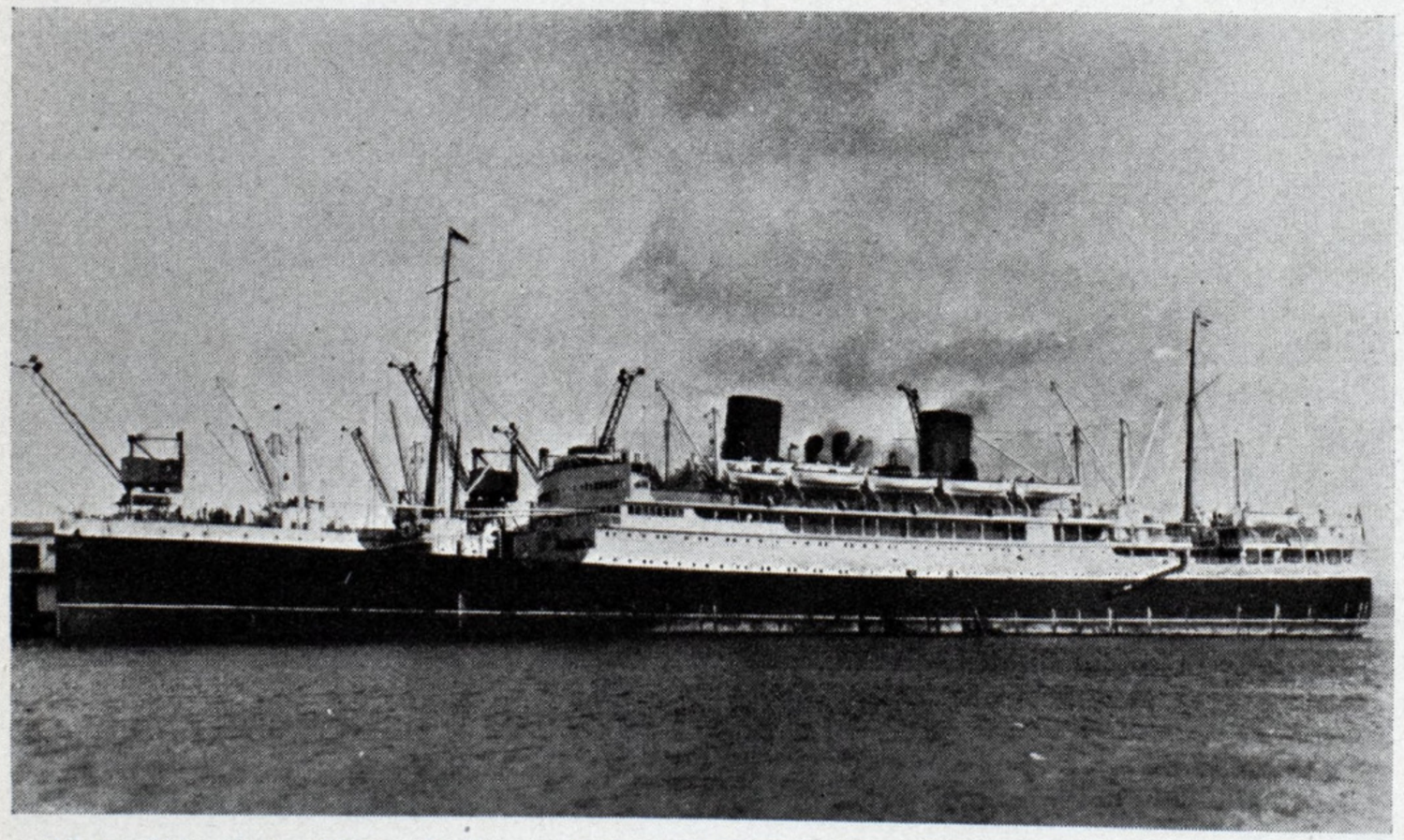
On the other hand, the steam engine shows a progressive decrease in fuel consumption with each increase in size, because more fuel saving refinements can be introduced and powers are now being approached at which the thermal efficiency will be about equal to the large oil engine which will then have to fall back on its other advantages to keep up the struggle. In a small cylinder the whole of the air can be effectively and economically attacked by one jet. In a large cylinder penetration to the remote parts is extremely difficult and proper mixing can only be attained in the region of the injector and before the jets have commenced to spread. The best result is obtained by dividing the combustion chamber up into a number of small combustion chambers and fitting an injector in each, which is in effect equivalent to considering the large cylinder as made up of a number of small cylinders. This is a complication but it has been found necessary to bring the fuel consumption in line with that realized in small engines.

Maintenance Costs Not Available

NO DEFINITE maintenance cost figures of large oil engines are available for publication. It is known that in some cases they have been high, but as it is still in its youth these may be looked upon as developmental charges due mainly to the big steps that had to be taken in a short time in order to enter into the competition for large passenger vessels which up to a few years ago were all steam driven.

Just as advances in pressures and temperatures are sure to bring about increased maintenance charges in the case of the steam engine, so does increase in size of the oil engine bring about a similar state of affairs. Liner and piston ring wear have always been a source of worry and whilst they are now considered to be within reasonable limits, there is still room for improvement.

The fact that all the wearing parts of an oil engine can be easily renewed as required is distinctly in its favor and there is, therefore, practically no end to its life. It is a signfiicant fact that the engne of the first ocean going motor ship, namely, the VULCANUS, is as good today as the day it was installed, whereas the hull is about finished and the owners will have to consider placing this 21-year-old engine in a new home. In the case of high pressure steam plants replacements are not so easy and nothing less than the prospect of re-boilering the whole outfit may have to be faced. This, however, is a matter that will take some time to determine on account of the comparative infancy of the best high pressure steam plants.



Motorship Rangitiki. Built in 1929; 16,698 *Gross Tons. Sea Speed* 16 *Knots Sulzer Two-Cycle Single Acting Diesels,* 9300 *B.H.P. at* 88 *R.P.M.*

Lubricating Oil Consumption

THIS is a small item in the case of steam plants, since it is impossible for any lubricating oil to reach the furnaces, which, in the case of the oil engine, adds to the apparent economy of the plant. It is known that for similar powers the oil engine is much more extravagant, since all the oil used for cylinder lubrication is entirely lost. It is either discharged into the exhaust system or the more volatile fractions are evaporated and consumed as fuel, leaving residues of carbon that collect at the bottom of the pistons or in the various elements comprising the exhaust system and which have to be removed periodically.

It is known that a good oil engine will run on lubricaing oil as a fuel and some of the published tests should be examined bearing this point in mind. It would appear that for a true comparison of fuel consumptions a combined figure including the lubricating oil used for the pistons should be considered. In the case of crosshead type engines having the pistons entirely outside the crank chamber the piston lubricating oil consumption can be definitely determined, but with trunk piston engines in which the pistons operate in the crank chamber, some notice must be taken of the crank chamber lubricating oil consumption, since a fair amount is splashed on the cylinder walls and lost in the exhaust system or consumed in increasing the power output.

Lubricating oil is an expensive fuel and any gain in power that it may give is far outweighed by the increase in running costs. The consumption for both main and auxiliary engines may be anything from five to ten times the amount for an equal steam plant.

Oil Engines or Steam

AN ENDEAVOR has been made to present in an unbiased fashion the relative merits and demerits of the two types of propelling machinery. It is of course, impossible to generalize the position as a whole, but the main characteristics have been outlined and the few special cases constituting the exceptions may be left to the reader's imagination.

At the present time and for powers up to about 3000 brake horsepower, the oil engine is supreme in all but coal producing countries. In Italy, Scandinavia, Belgium and Holland it has practically no competitor, the construction of steam tonnage being almost negligible. In the first named country the Fiat company alone had 160,000 brake horsepower of engines either going through their shops or on order at the end of last year.

In Great Britain the position is more complex, but if the tonnage represented by the large steam vessels, such as the new Cunarder and the MONARCH OF BERMUDA be subtracted the weight of oil engine and steam driven vessels is about equal, and observing that we are dealing with a purely coal producing country the oil engine appears to enjoy a privileged position, but as many of the ships are for foreign owners or intended for trading in parts of the world where oil is plentiful and coal is dear, the mere statement of figures gives absolutely no indication of the trend of thought of the British shipowner. In France and Germany the position is somewhat similar.

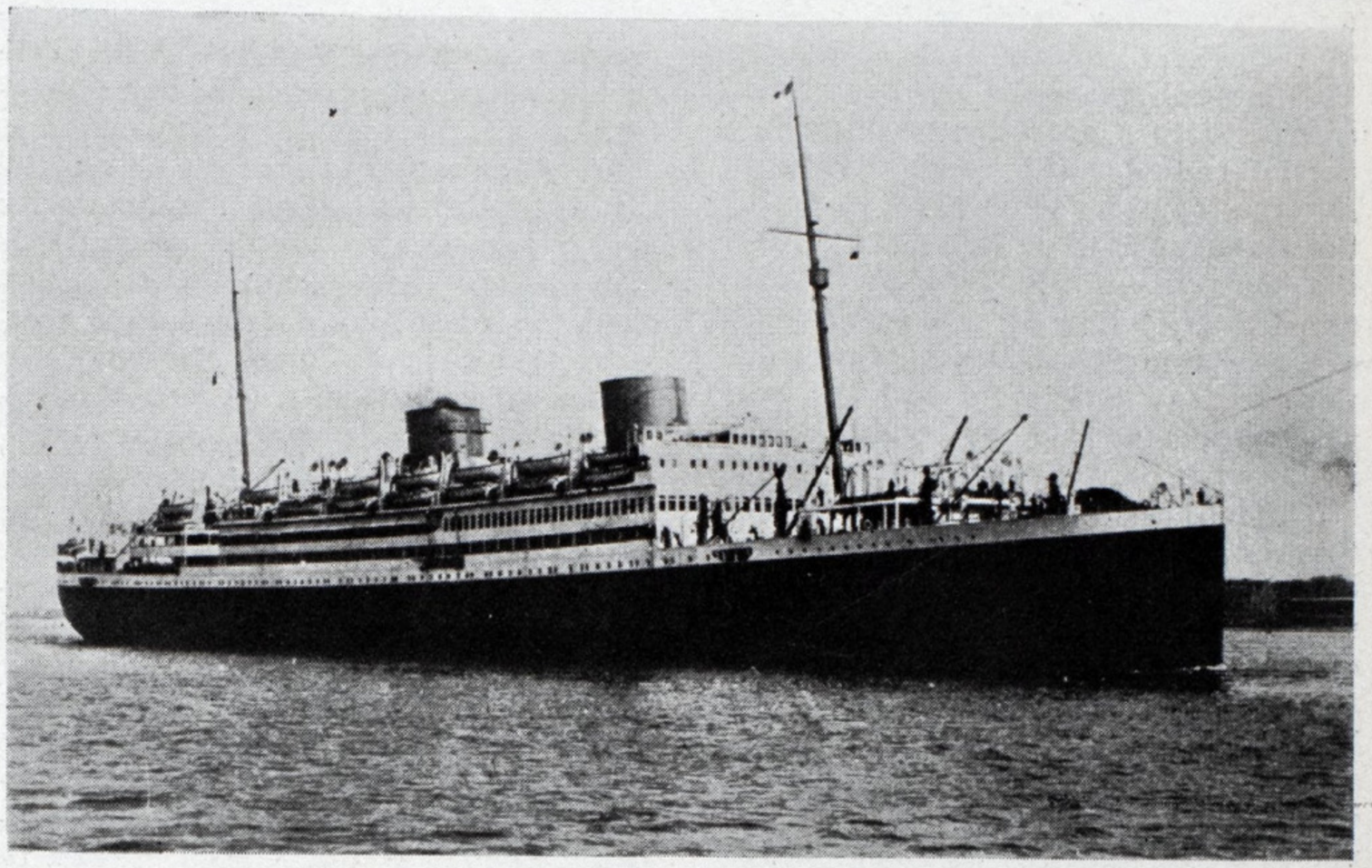
In America and particularly on the West coast, the low price of boiler oil has, in recent years, exercised an important influence on the situation and steam is now favored for all but the most moderate powers. When the increased cost of the refined oil required by the oil engine and its heavier lubricating oil consumption are taken into account, there is no advantage one way or the other, in which case and for reasons too obvious to mention the established steam plant must win.

In support of this it is only necessary to refer to the perfectly successful three-year-old quadruple screw motor ship BERMUDA and her recently launched steam sister ship MONARCH OF BERMUDA, where fuel oil costs was the only determining factor in the change over in the type of machinery. As regards the combined weight of machinery and fuel for a radius of action of about 5000 miles the balance is at present in favor of the oil engine, but according to the relative advances in efficiency of the two types this cannot be maintained for very long.

High Power Diesel Installations

THIS, does not take into account the probable adoption of fabricated framing for oil engines to which we will now refer. The effect of the appearance of the German pocket battleship DEUTSCHLAND with her 50,000 brake horsepower oil engines must be considered as having an important bearing on the future of the large mercantile motorship, but the difference between the two services have to be taken into account. Bearing in mind that Germany was the chief breeding ground of the oil engine, some allowance should be made if a pardonable amount of preference has been shown. It should, however, be noted that but for the intervention of the Great war all German battleships from about 1917 onward would have been propelled by oil engines. In 1915 a 12,000 brake horsepower battleship unit had been completed but was never put to sea since obviously it would have been madness to carry out such an important experiment during a national emergency. It was destroyed under the terms of the armistice but served as a most vital step in the development of the present type of machinery.

Driven legislation to get the maximum fighting qualities out of a given weight, the oil engine was deliberately selected for this particular ship and after full consideration of all alternative types, a choice that would be natural even if all other things were equal. Attack and defense are the only objects for which a warship is made and the propelling machinery is looked upon as a necessary evil and any saving in weight can be put into guns and armament. It was therefore a great compliment to the oil engine to be selected as the lightest and most suitable type of power plant. The German admiralty is fully aware of all the advantages of high pressure steam and it is unlikely that it would make the choice merely to glorify the name of Diesel.



Motorship Asturias, Royal Mail. Of 22,071 Gross Tons. Built by Harland & Wolff in 1925. First of the Big Motorships Introducing the Stocky Funnel

Radius of action has no doubt played an important part in the conception of this warship for reasons that do not apply to passenger ships. At reduced powers the oil engine is much more efficient than the steam engine and as a warship is very seldom called on to develop more than 25 to 50 per cent of its power, which is all that is necessary for cruising speeds, its radius of action is greatly increased. In an emergency full power can be instantly switched on, which is a valuable asset for a fighting ship and a condition that can only be fulfilled by the oil engine. These good points are of little or no moment in the case of large passenger vessels which are, as a rule, able to carry sufficient fuel for the round trip and must always make the voyage from port to port at full power, so that this isolated victory for the large oil engine cannot be taken as a general trend of thought.

The superiority in weight was achieved by making the framing of welded steel plate, but originality cannot be claimed for this practice. About 1910 several Capitaine gas engines were built on the Clyde having riveted fabricated structures, because electric welding was practically unknown at that date as a commercial process. An experimental gas engine was actually fitted into an old British gunboat called the RATTLER, but was only moderately successful chiefly on account of gas producer and what might be called teething troubles.

A riveted structure deflects about twice as much as a solid one, and as rigidity is the essence of good oil engine design, there should be a future for the solid welded framing, particularly in view of the claim that it is not much dearer than cast framing. This claim may be substantiated where weight cutting has previously been done by using troublesome cast steel but in any case cost is of no moment where warships are concerned. It might even compete with cast iron framing for commercial purposes, providing the quantity is such that drop forgings could be used for bearing seatings and other such parts, since foundry wasters would be eliminated and through bolts rendered unnecessary. This would for a time at least, send the large oil engine for mercantile practice ahead of steam plant.

The other great saving in weight that made this wonderful ship possible was effected by electrically welding the hull. Here again there is nothing novel since Britain produced such a ship nearly ten years ago, but trade union rules made the cost so high that the experiment was not repeated. This reference is to the rivetless motor ship FULLAGAR, built by Cammell Laird & Co. at Birkenhead. The great toughness of the construction is demonstrated by the rough usage it has received. On one occasion part of the bottom was lifted about nine inches without leaking a drop of water, and on another, the bows were so badly buckled that a riveted ship would have become a total loss.

Powerful River Towboat Completed

Herbert Hoover Christened at Dubuque, Ia.—Twin Screw—Diesel Engine —Total Horsepower, 2200—Can Tow 10,000 Tons of Freight Up Stream

WHAT has been termed the greatest river boat in the world was christened the HERBERT HOOVER by Mrs. T. Q. Ashburn at Dubuque, Iowa., on Aug. 15. This vessel is unique in her powerful main propulsion drive which consists of two diesel engines each developing 1100 brake horsepower and each direct connected to a propeller working in a partial tunnel. The vessel was built for the Inland Waterways Corp. by the Dubuque Boat & Boiler Co. After the christening the HERBERT HOOVER had her trial trip of two round trips over a seven-mile course. The trials were entirely successful and the boat will proceed down river to enter service between New Orleans and St. Louis.

Major General T. Q. Ashburn, executive head of the Inland Waterways Corp., announced that plans are now under way for two more diesel powered towboats similar to the HERBERT HOOVER and that these new boats will be named HUCK FINN and TOM SAWYER. Though specifications are under way for the two new boats, bids will not be asked until the HERBERT HOOVER has been given thorough tests throughout the month of September.

Good for Large Capacity Tow

The new towboat is 226 feet 4¾ inches in length overall; 215 feet in length molded; 43 feet 6 inches in beam molded; 10 feet in depth at side; 2 feet 3 inches in sheer forward; 1 foot 1 inch in sheer aft. With 150 tons of bunker diesel fuel oil the draft is an even 6 feet. The camber in the beam of 43 feet 6 inches is 8 inches. The machinery space which is amidships is 58 feet long by 33 feet wide. In this space are located the two main diesel engines each of 1100 brake horsepower.

In one tow the new towboat is able to move 10,000 tons of freight at an average speed of more than four miles an hour upstream.

In working out the plans for the HERBERT HOOVER under the general direction of Major General T. Q. Ashburn, every effort was made to modernize all features of propulsion and hull construction in order to obtain the utmost in efficiency and in adaptability for river service under present-day conditions. First of all it was decided that the vessel must have ample power to take care of a large profitable tow under all conditions. Next it was decided that this power must be developed economically and with the least possible loss in transmission to the propellers.

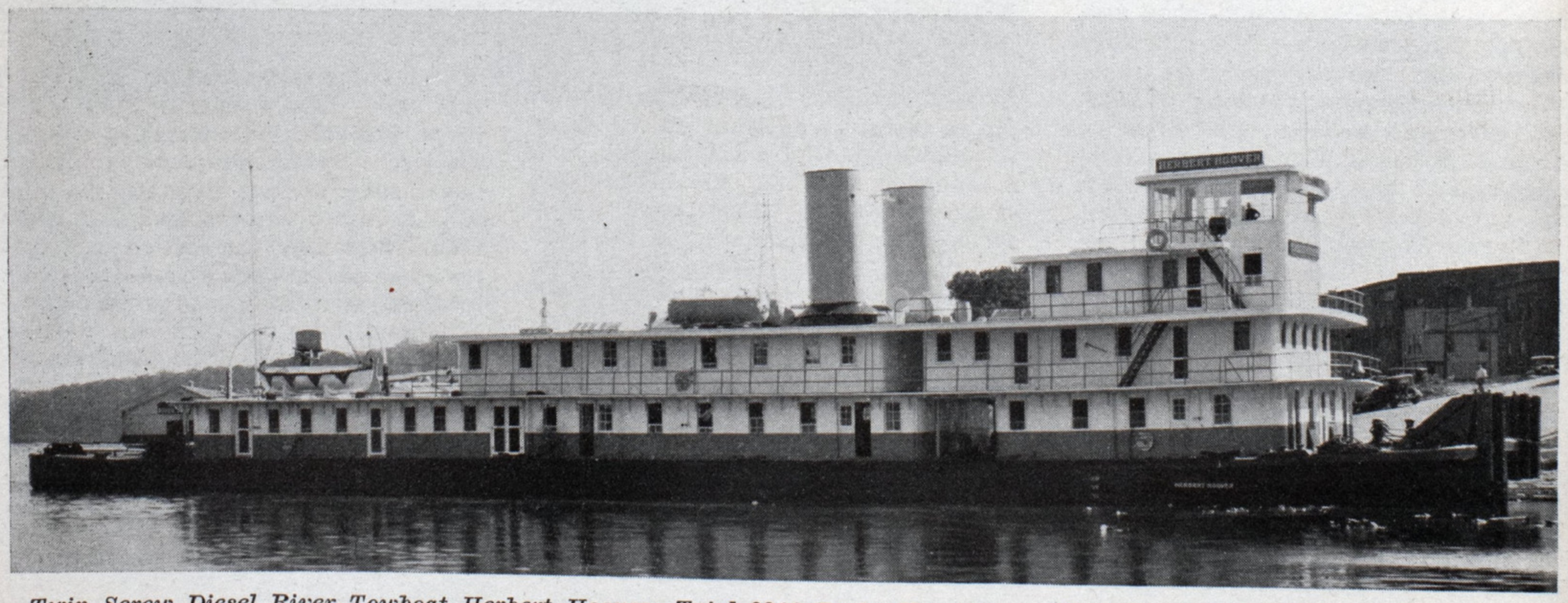
The chief feature of interest, therefore, in this modern river towboat is her machinery. The main engines are full diesels built by McIntosh & Seymour Corp. One is right-hand and one left-hand. They are arranged in parallel and directly connected to the propeller shafts, giving a good spread to the propellers which work in partial tunnels, the stern transom of the vessel sealing the water to the tunnels.

The engines are trunk piston, of 8-cylinders, four-cycle, air injection and have 20-inch bore and 24-inch stroke. At 200 revolutions per minute each engine develops 1100 brake horsepower or 1466 indicated horsepower. The maximum rating is 1300 brake horsepower at 230 revolutions per minute. The fuel consumption is estimated to be 0.41-pound of diesel fuel oil per brake horsepower per hour.

Built on compact lines, these engines permit a minimum weight per horsepower for solid substantial construction. The frame and cylinders are in one casting, making the en bloc type of construction. The base is also cast in one piece which in addition to serving as a seating for the main bearings provides a convenient drip for lubricating oil. Oil cooling is used for the pistons, the oil being conducted to and from the pistons by swinging joints. These swinging joints connect to suitable headers, the oil running from the pistons being carried by the header to the sump tank rather than to the base. Both piston cooling and lubricating oil systems are combined in one and one sump tank is provided for the two. A motor driven lubricating oil pump takes the oil from the sump tank, forces it through a cooler, where the systems divide, one branch going to the piston cooling header and the other branch going through a reducing valve to the forced feed system. In this way all main bearings and connecting rod bearings are lubricated.

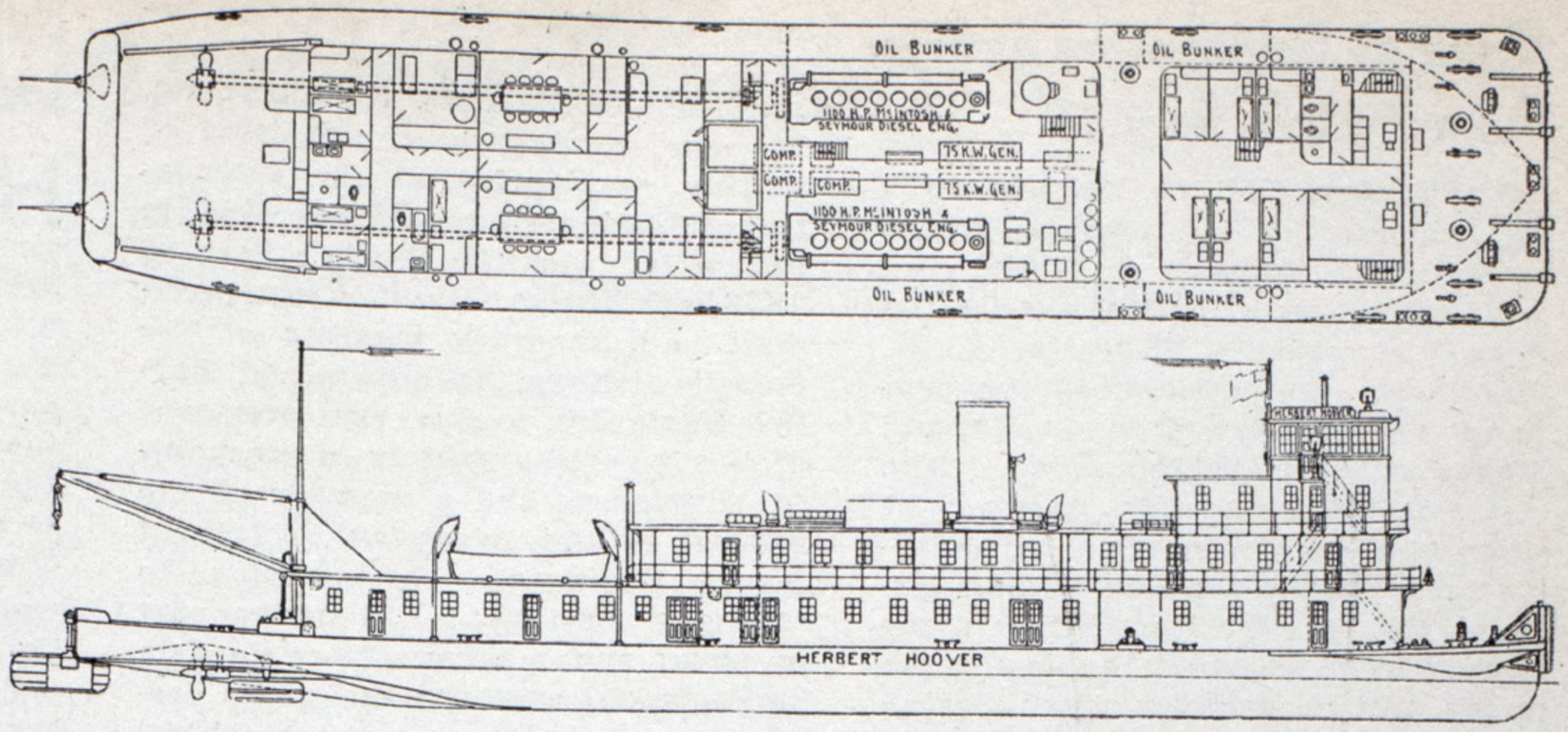
Diesel Engines Direct Connected

The engines are direct reversible and the engineer has complete control of both engines from one point. All maneuvering is done by two handles, one controlling the fuel and starting air, the other controlling the ahead or astern position of the engine. Reversing is done by air rams. There are two of these rams and air for operating them is supplied from the maneuvering tank. The opposite side of each ram acts on an oil cushion and the speed of reversing is controlled by a valve which is introduced by an interconnecting line between the two rams. By operating the reversing handle suitable air valves are opened admit-



Twin Screw Diesel River Towboat Herbert Hoover—Total 2200 Brake Horsepower—Built by Dubuque Boat and Boiler Co.

GENERAL arrangement of the Mississippi River towboat Herbert Hoover. In recent years the development in design of river craft has received great impetus through the courageous initiative of the Inland Waterways Corp. under the direction of Major General T. Q. Ashburn. New types and application of power are being tried out under practical conditions of operation.



ting air for the reversing operation.

The fuel control lever and reversing lever are so interlocked that reversing cannot be done while the engine is in operation, nor can the starting air be turned on while the engine is in the act of reversing. Thrust bearings mounted separately from the engine base are of the Kingsbury oil lubricated disk type.

The hull is of substantial steel construction throughout with a center-line bulkhead except in the way of the engine room where it is of truss construction, forming the main strength girder. Transverse, closely spaced, framing is used and there are six transverse watertight steel bulkheads. In the way of the engine room on each side oiltight longitudinal bulkheads form wing fuel an water tanks. Fore and aft intercostals are run below the main deck at either end of the vessel. The superstructure is designed to give added strength to the machinery deck amidships. This deck carries a weight in machinery, equipment and fuel of about 500 tons.

Engine Room Auxiliaries

Among the auxiliaries in the engine room are two Atlas-Imperial diesel engine generating sets each connected to a 75-kilowatt 125-volt direct current Westinghouse generator. There is also an additional Atlas-Imperial diesel engine generating set direct connected to a 15-kilowatt Westinghouse generator. The 75-kilowatt generators are each of sufficient capacity for all of the auxiliary load, including steering gear, pumps, lighting, refrigeration, capstans and radio, while the small generator is used only in port. There is a two-stage motor driven Worthington air compressor. There is also a small 11 cubic feet per minute steam driven emergency air compressor.

Pumping equipment is complete and was supplied throughout by the Worthington Pump & Machinery Corp. There are four centrifugal pumps, two for water service and two for jacket cooling, each driven by a 15-horsepower motor. For oil circulation there are two rotary pumps each driven by a 30-horsepower motor. In addition there is a centrifugal fire pump driven by a 20-horsepower motor and a reciprocating circulating bilge pump driven by a 5-horsepower motor.

For both culinary and engine use the river water is filtered by being passed through a Roberts water filter of 3000 gallons capacity in 24 hours. For drinking purposes the water is passed through a small still.

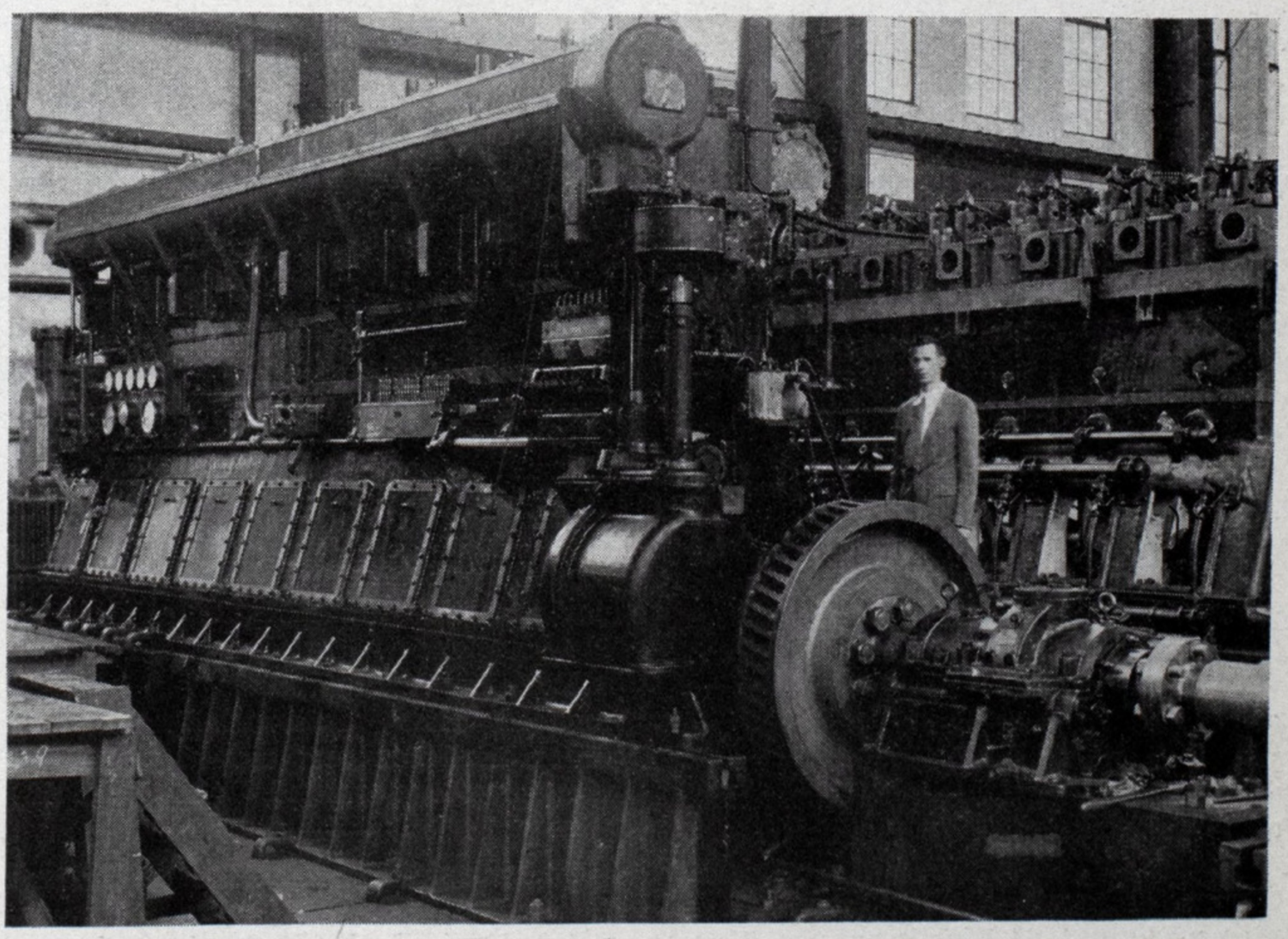
Deck machinery on this powerful modern river towboat was supplied by the American Engineering Co. and consists of four capstans, two electric motor driven with 25-horsepower motors and two driven by 15-horsepower steam engines. There is also a deck winch driven by a 5-horsepower motor serving a boom for general service.

The four rudders in pairs athwartships are controlled by the two steering gear units, each pair separately from the wheelhouse. One pair of rudders are located forward and one pair aft of the propellers, giving the vessel a maximum maneuverability. There are two American Engineering Co. hydraulic electric steering gear units in the engine room direct connected to the rudder quadrants with steel cables. One of these units is driven by 25-horsepower motor and the other, for the forward rudders, is driven by a 15-horsepower motor. Controls to the steering engines from the pilot house consist of shafting and gears operated by two levers.

An Original Design Adopted

Credit for the innovations worked out in the towboat HERBERT HOOVER is due Major General T. Q. Ashburn and his staff. The detailed design and original plans and specifications were worked up by The Dravo Contracting Co., Pittsburgh. The boat is classed in the American bureau of shipping and was constructed under its special survey. I. N. Davenport, secretary and general manager of the Dubuque Boat & Boiler Co., was in active charge of construction throughout.

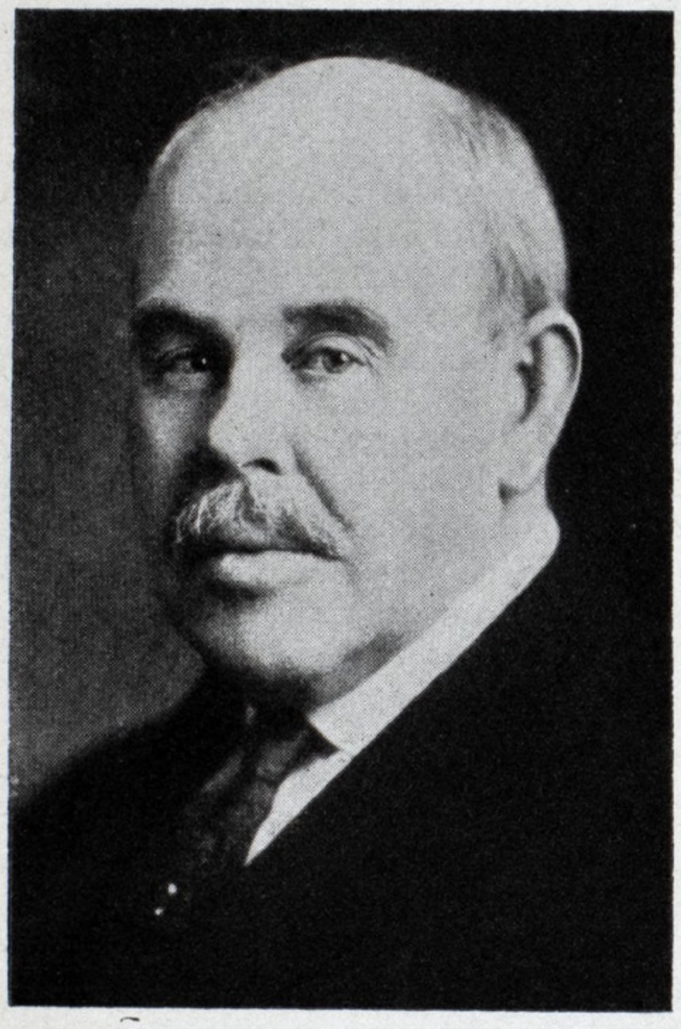
The next international navigation congress will be held at the Doges' Palace, Venice, in September. Delegates from the principal maritime nations and from private organizations are expected to attend. Among the subjects to be discussed are inland navigation, harbors, docks, lighthouses and shipbuilding and construction of ports.



One of the 1100 B. H. P. McIntosh & Seymour Diesel Engines, Installed in the Twin Screw River Towboat Herbert Hoover

Dean of Engineering Retires From Active Service

CAPT. WALTER M. McFARLAND, manager of the marine department of the Babcock & Wilcox Co., will retire from active service on Sept. 1 by reason of ill health. C. W. Middleton, vice president of the company, in commenting upon Captain McFarland's resignation said: "The Captain has been with us over 21 years and those who are at all familiar with marine matters will understand the regret with which we see him retire. Although he has given up his post as manager of the marine department, he has very kindly consented to give us, from time to time, the benefit of the extensive experience that he has accumulated since his graduation from the Naval academy in 1879."



Capt. W. M. McFarland

Captain McFarland was born in Washington, D. C. in 1859 and was educated in the public schools of Washington, the preparatory department of Columbia university and the United States Naval academy. In 1881 he was commissioned as assistant engineer, in 1891 as past assistant engineer and in 1898 as chief engineer. He was for more than 20 years the youngest officer to have reached the latter grade. He served on naval vessels in various parts of the world and was at one time principal assistant to Admiral Melville who was then engineer in chief of the United States navy. In 1897 he was a member of the board to reorganize the personnel of the navy, which was presided over by President Roosevelt, who was at that time assistant secretary of the navy.

Captain McFarland resigned from the naval service in 1899 to become vice president of Westinghouse Electric & Mfg. Co., which position he held until April 1910, when he became manager of the marine department of the Babcock & Wilcox Co. He was secretary of the division of marine engineering at the International Engineering congress held in connection with the World's Fair, in 1893, at Chicago. He is a past president and honorary member of the Society of Naval Architects and Marine Engineers, a past vice president of the American Society of Mechanical Engineers and a member of the council of the American Society of Naval Engineers. In addition to taking a prominent and active part in naval and marine affairs Captain McFarland found time to make frequent contributions to the technical press of the counry. He is president of Webb Institute of Naval Architecture and has lectured at many colleges and universities including the United States Naval War college.

J. H. King has been appointed manager of the marine department of the Babcock & Wilcox Co. to succeed Capt. Walter M. McFarland.

Sale Contract Approved For Diamond Lines

Approval of the sales contract covering sale of the American Diamond lines to the Black Diamond Steamship Corp., New York, was granted by the shipping board on July 28. The sale, which was agreed to under a resolution dated June 3, 1931, is to be made in consideration of $1,660,181.25 under terms to guarantee performance of conditions set forth in a proposed ocean mail contract covering the route served by this line.

The price is predicated upon performance by the purchaser of certain improvements to the line consisting of the construction of five 16-knot steamers during a 10-year period and the reconstruction of five of the present steamers to give them speeds of 13-knots. In the event these improvements are not effected, the sales price will be at the rate of $28.65 a ton instead of $16.25 a ton.

The line consists of 12 typical 10-knot cargo vessels which have an aggregate tonnage of 102,165 deadweight. The owner will be required to make not less than 72 round voyages a year, of which 24 will be semi-monthly sailings from New York to Rotterdam, 24 semi-monthly sailings from New York to Antwerp, and the balance semi-monthly sailings from North Atlantic ports of the United States other than New York to the foreign ports named.

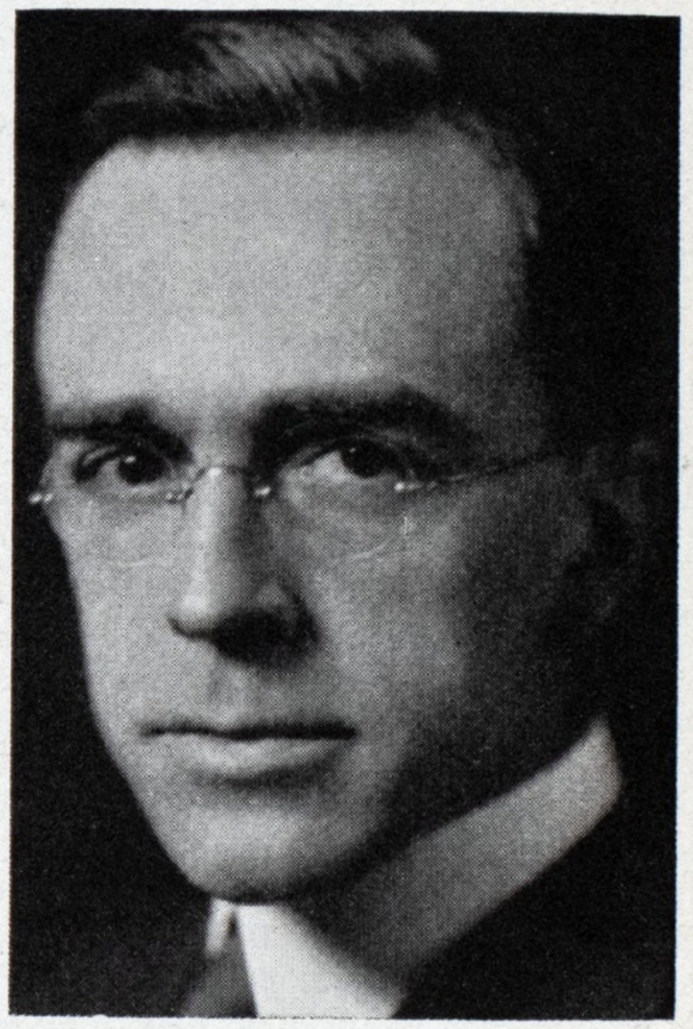
Delivery of the vessels will be commenced after matters affecting the ocean mail contract covering the service have been settled. (See page 56)

Lukenweld, Inc., division of Lukens Steel Co., Coatesville, Pa., has appointed W. R. McDonough & Co. as representative in Cleveland.

Resigns to Join Board of Industrial Counselors

H. E. STOCKER, who for the past two and one-half years has been conducting the department in MARINE REVIEW devoted to cargo handling entitled "Modern Stevedoring and Dock Management," resigned from the Munson-McCormick line on Aug. 8 and is now associated with the Board of Industrial Counselors, Inc. as manager of the industrial division.

Mr. Stocker was formerly resident manager of the McCormick Steamship Co. at New York and his experience and interest in shipping affairs have been particularly centered on the handling of cargo and general dock equipment problems. He has made a practical study of this phase of the industry on both the West and East coasts as well as abroad.



H. E. Stocker

Bruce Ford, Inventor, Dies

On Aug. 10, Bruce Ford, second vice president of the Electric Storage Battery Co., died at his home in Chestnut Hill, Philadelphia.

Mr. Ford, one of the country's foremost authorities on storage batteries, had more than 80 inventions to his credit. Born in Brooklyn, N. Y., 58 years ago, he was educated in St. Paul's school, Garden City, L. I., and Brooklyn Polytechnic institute. After serving two years as a draftsman with the Electric Storage Battery Co., then a small concern, he left the company in 1892 to become associated with the Johnson Co. and the Lorain Steel Co. in Johnstown.

In 1899 Mr. Ford returned to the Electric Storage Battery Co. as engineer in charge of development and design. He rose rapidly, becoming vice president in charge of technical development in 1913.

How to Lubricate Steam Cylinders

Plug Pistons Inefficient—Proper Lubrication Eliminates Piston Ring Trouble—Cases Cited—No Danger of Oil in Feed Water

By O. M. Gordon

PLUG pistons and hoods are obsolete and inefficient. In the early days of reciprocating steam engines, low steam pressures were employed. This low pressure wet steam was not at all efficient as we know steam engine efficiencies today with high pressure superheated steam. Even with the low steam pressures, on some installations, much trouble was experienced with excessive wear and breakage of piston rings particularly in the high pressure cylinders. In order to overcome this trouble many plug pistons and hoods were installed in high pressure cylinders to replace piston rings and some are still in use.

While the ring trouble was overcome the plug piston did not solve the engineering problem. The fuel consumption reflects the tightness of the pistons working in the cylinders, and the plug or hood type cannot be fitted steam tight. While a loosely fitted piston minimizes actual wear it is conducive to gross inefficiencies on account of heavy steam leakage.

The excessive wear of piston rings with eventual breakage is due in most cases to lack of correct lubrication and some owners and engineers are apparently willing to sacrifice maximum operating efficiency and economy with the plug piston for groundless fear of getting cylinder oil into the boilers. Under present conditions when every conceivable economy counts there is no place for the wasteful plug piston or hood in any reciprocating engine. Piston rings will give lower fuel consumption, but we must consider their service value from the practical operating viewpoint

Various Types of Piston Rings

There are many types of piston rings all of which are superior to the plug piston from an economy standpoint. In the accompanying illustration Fig. 1 is a cross section of a high pressure valve, valve chest, cylinder and piston. Figs. 2, 3. and 4 are cross sections of different type high pressure piston rings. In Fig. 1 it can be easily visualized what would happen if the piston rings were removed and a hood or plug piston installed that could not possibly be steam tight while traveling in the cylinder. With the piston rings it is also obvious that mechanical friction is set up as indicated by grunts and groans every stroke of the piston. This frictional noise is also common with plug pistons and hoods, and means loss of power in addition to excessive wear of working parts.

It is a matter of universal knowledge when metal is rubbed on metal, excessive heat is generated and wear of the metal takes place. The amount of wear is proportional to the actual pressure forcing the moving pieces together plus the speed and character of materials. To eliminate or minimize the wear of working parts fluid friction must replace mechanical friction and this cannot be done by injecting by hand periodically a mixture of graphite and oil, or tallow, through the antiquated tallow cup or hand pump.

Lubrication is the science of separating moving metal parts by introducing and maintaining a suitable film of lubricant between the parts or replacing mechanical friction with fluid friction. There are a few marine installations where the steam is so wet no internal lubrication is considered necessary except by swabbing the valve stems and piston rods, but such installations obviously do not operate efficiently.

Efficient Steam Cylinder Lubrication

Swabbing rods and valve stems is not only wasteful of oil but highly inefficient in other respects. The cylinder oil reaching cylinders and valves by this method is not distributed over the cylinder walls and valve surfaces and most of this oil passes through the engine without actually lubricating, with the result that more swabbing is necessary and much of the oil collects in the filter box or hot well and some

(*Continued on Page* 58)

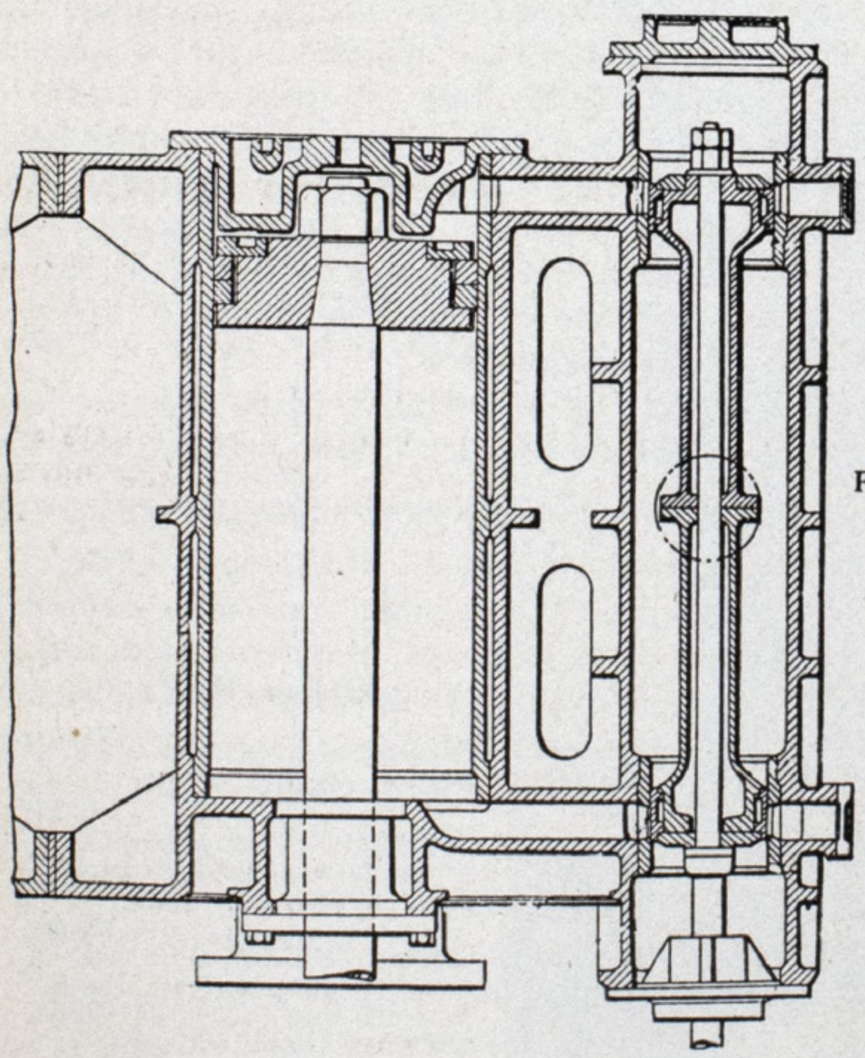


Fig. 1—High pressure cylinder with piston valve

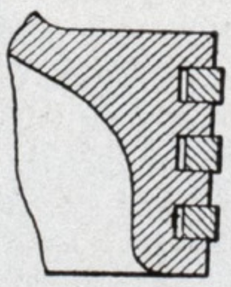


Fig. 2—Ramsbottom piston packing rings

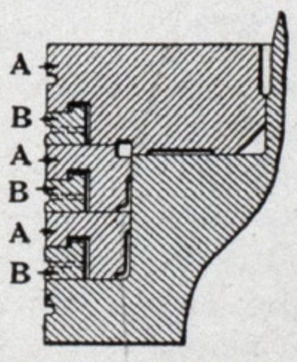


Fig. 3—Piston packing ring with expansion restricted by a shoulder

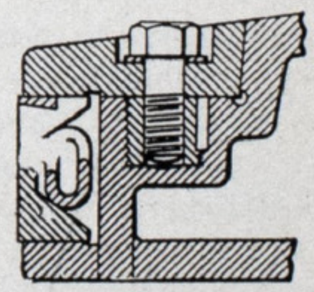


Fig. 4—Double type piston ring, with spiral spring to produce expansion

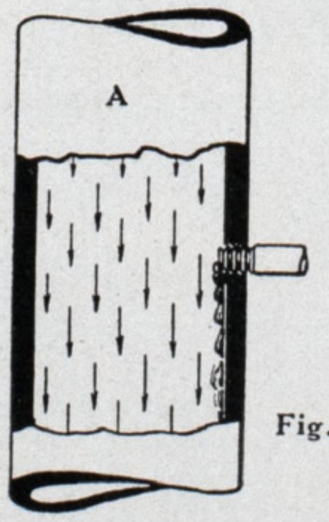
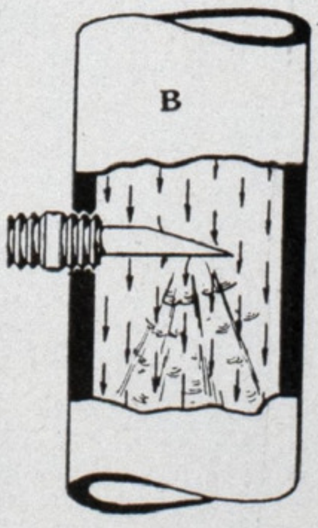


Fig. 5



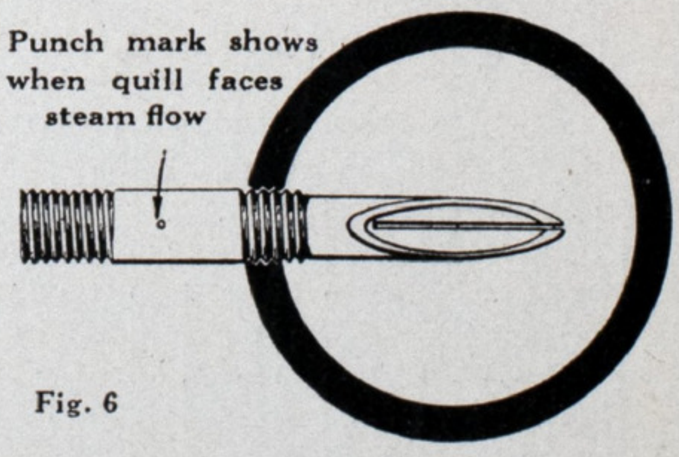


Fig. 6

Diagrams to Illustrate Steam Piston Ring Arrangements and Effective Lubrication to Minimize Wear and Trouble

Latest Data on New Marine Work

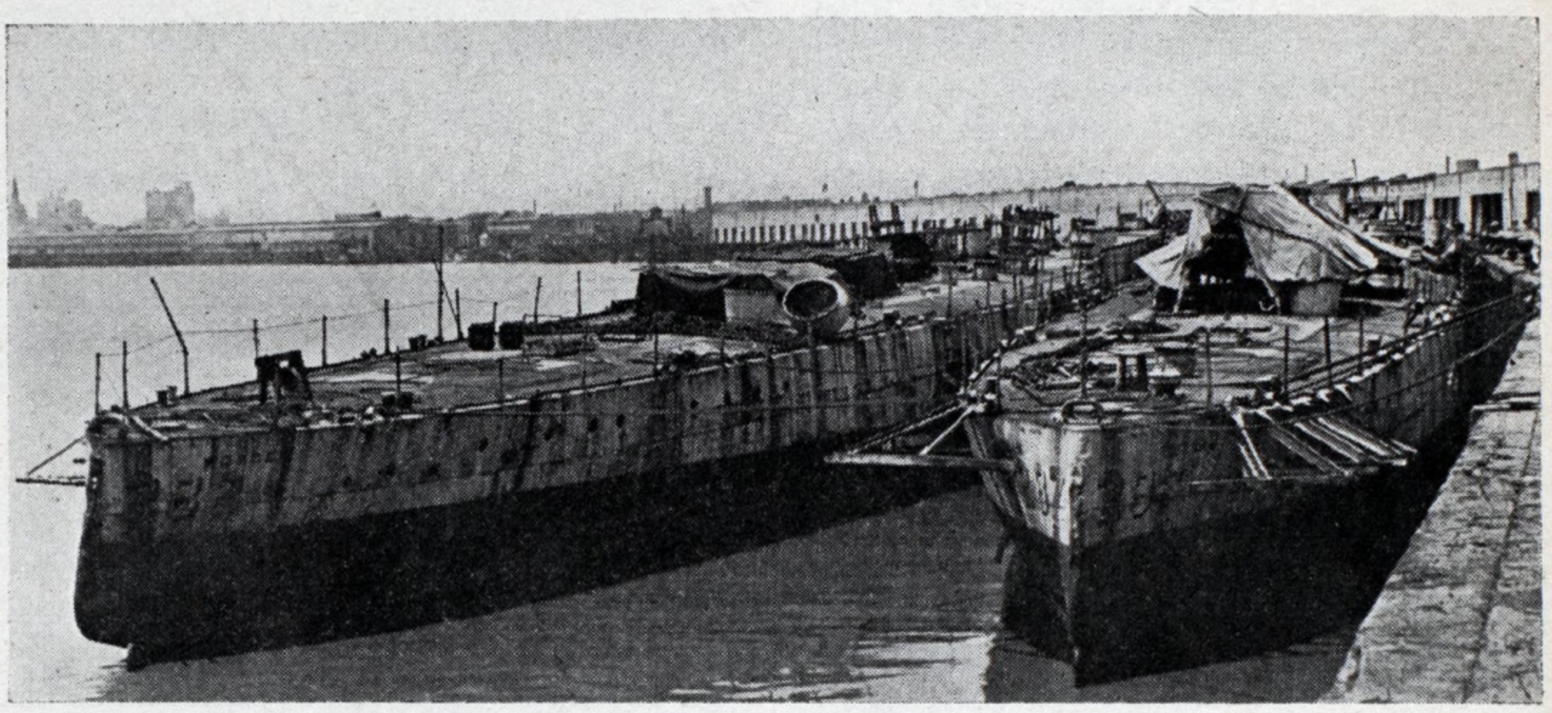
Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

STEEL, self propelled vessels each of 1000 gross tons or over, under construction in American shipyards for private owners as of July 1, 1931, are reported by the department of commerce as follows:

Three passenger and cargo vessels of 17,500 gross tons each under construction by the Bethlehem Shipbuilding Co. for the Oceanic Steamship Co. Three passenger and cargo vessels each of 7200 gross tons at the same yard for the United States Mail Steamship Co. Also one tanker of 1534 gross tons at the same yard for the Standard Transportation Co. Four passenger and cargo vessels of 11,000 gross tons each at the Federal Shipbuilding Co. for the Grace line. Newport News Shipbuilding & Dry Dock Co. had under construction two passenger and cargo steamers of 21,900 gross tons for the Dollar Steamship line; three passenger and cargo vessels of 7500 gross tons each for the United Mail Steamship Co.; and two passenger and cargo vessels of 5700 gross tons each for the Eastern Steamship lines. The New York Shipbuilding Co. was building two 30,000-ton passenger and cargo vessels for the United Line Inc. Four tankers of 9000 gross tons each for the Motor Tankship Corp., and one 8272 gross tons passenger vessel for the American South African line were under construction at the Sun Shipbuilding & Dry Dock Co.

Convert Former Destroyers

Profitable use in peace time pursuits of ex-navy destroyers has been found by the Standard Fruit and Steamship Co. which is now converting the former destroyers WORDEN 287 and PUTNAM 288 into banana carriers for the Central American trade. Two ships, stripped of their armor and war equipment, including turbines, at the League Island naval station, Philadelphia and towed to New Orleans, are being equipped for the transportation of cargo by the Frolich Iron Works.



Former navy destroyers, Worden 288 and Putnam 287, being converted at Frolich Iron Works for the banana trade of the Standard Fruit & Steamship Co.

Diesel engines powerful enough to give the vesesls a speed of 16 knots with full cargo aboard, and insuring low operating costs, are being installed to displace the turbines that developed 27,560 and 27,750 horsepower per vessel and accorded a speed of 34 knots. The flush deck is being preserved in the placing of superstructure for peaceful operation. The two vessels were among the early groups of the flush type destroyers that displaced the smaller, high bow type prevailing before the world war.

When completed and in operation the vessels will have a cargo capacity of 25,000 bunches of bananas, and will carry six officers and a crew of 24 men each. Remodeling is under the direction of Joseph Frolich, supervised by J. Low, marine superintendent of the company. The company had previously tried out destroyers in the banana trade with three smaller, slower vessels, the TRUXTON, the WHIPPLE and the WORDEN.

The PUTNAM 288 was built in 1919 by the Bethlehem Shipbuilding Co. at Squantum, Mass., of 1215 tons displacement with armor plate. It is 310 feet long, has a beam of 30 feet 11½ inches, and a draft of 9 feet 4 inches. The WORDEN 287 a sister ship, was built by the same company a year later.

Health Service Tug

The accompanying illustration shows the new steel diesel public health service tug W. M. WIGHTMAN, which was designed for quarantine boarding duty by associate naval architect P. W. Clark of the public health service, and built by General Engineering and Dry Dock Company, Oakland, Calif. It was delivered in July for service at the San Diego, Calif., quarantine station.

The WIGHTMAN is 60 feet 10 inches long overall, 15 feet molded beam and

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Aug. 18, 1931	4.75@5.00	.75	3.47½
July 18	4.75@5.00	.85	3.72½
June 18	4.85@5.25	.90	3.84½
May 18	4.85@5.25	1.00	4.08
April 18	4.85@5.25	1.10	4.32
Mar. 18	4.85@5.25	1.10	4.55½
Feb. 18	4.85@5.25	1.10	4.55½
Jan. 18	4.85@5.25	1.10	4.55½
Dec. 18	4.85@5.25	1.10	4.55½
Nov. 18	4.85@5.25	1.10	4.92
Oct. 18, 1930	4.85@5.25	1.10	4.92

At Philadelphia

	Coal trim in bunk per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Aug. 18, 1931	4.75@5.00	.75	3.45
July 18	4.75@5.00	.85	3.70
June 18	4.85@5.25	.90	3.80
May 18	4.85@5.25	1.00	4.4
Apr 18	4.85@5.25	1.00	4.60
Mar. 18	4.85@5.25	1.00	4.88
Feb. 18	4.85@5.25	1.00	4.88
Jan. 18	4.85@5.25	.85	4.88
Dec. 18	4.85@5.25	.95	4.88
Nov. 18	4.85@5.25	1.00	4.88
Oct. 18, 1930	4.85@5.25	1.05	4.88

Other Ports

Boston, coal, per ton	$7.75
Boston, oil, f. a. s., per barrel	0.92
Hampton Roads, coal, per ton, f.o.b., piers	$4.35 to 4.50
June 9—Cardiff, coal, per ton	13s 6d
London, coal, per ton	—s —d
Antwerp, coal, per ton	18s 0d
Antwerp, Fuel oil, per ton	67s 6d
Antwerp, Diesel oil, per ton	82s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d

New steel diesel tug W. M. Wightman for quarantine boarding duty

has a draft of 7 feet 2 inches, and is powered with a Fairbanks, Morse & Co. direct reversible 4-cylinder, 10 inches by 12½ inches, 140 horsepower diesel engine which, turning a 52 inch by 40 inch Type I Columbian propeller at 369 revolutions per minute develops a speed of 9.8 knots with 16 per cent apparent slip.

Bids Received for Dredge

Bids have been received at the offices of the chief of engineers, war department, Washington, for constructing and delivering afloat one steel hull, steam driven stern wheel 24-inch pipe line dredge for St. Louis. This dredge is to be 224 feet 1⅝ inches long overall, 196 feet between perpendiculars, 44 feet 4 inches molded beam, 7 feet molded depth at side and 7 feet 6 inches depth at center. Draft is not to exceed 4 feet 1 inch in service with 500 gallons of fuel oil, 800 gallons of potable water, etc., on board. Propelling engines will be two horizontal tandem compound poppet valve condensing engines.

Bids received were as follows: The Dravo Contracting Co. $359,500 completion in 295 days. Taking the bid of the Dubuque Boat & Boiler Co., $385,000, completion in 245 days which was the earliest delivery date bid, and applying the $300 value per calendar day raises the Dravo bid to $374,500. Chas. Hegewald Corp. $444,539 completion in 365 days, price adjusted for delivery $480,539. Howard Shipyards & Dock Co. $397,743, completion 250 days, price adjusted for delivery $399,243. Marietta Mfg. Co. $418,000, completion 300 days, price adjusted for delivery $434,500. Nashville Bridge Co. $393,000, completion in 350 days, price adjusted for delivery $424,500.

Launch Big Italian Liner in Presence of Royalty

The REX, 50,000-ton vessel designed for the southern route to the United States, was launched Aug. 1 in the presence of King Victor Emanuel and Queen Elena of Italy.

Making a speed of 27 knots or more, the REX, flagship of the Navigazione Generale Italiana line, is expected to cross from Naples to New York in seven days.

The liner will carry five classes of passengers—400 in first, 250 in second, 300 in second class tourist, 400 in "Intermediate," and 900 in third, besides a crew of 800.

The steamship has broken a record for construction thus far. Her keel was laid only 15 months ago—April 27, 1930. The hull weighs 15,000 tons.

The ship is divided into 15 compartments by means of thirteen bulkheads. It can float with three compartments flooded and navigate with two flooded.

Twenty huge motor launches will be carried, each with capacity for 150 persons.

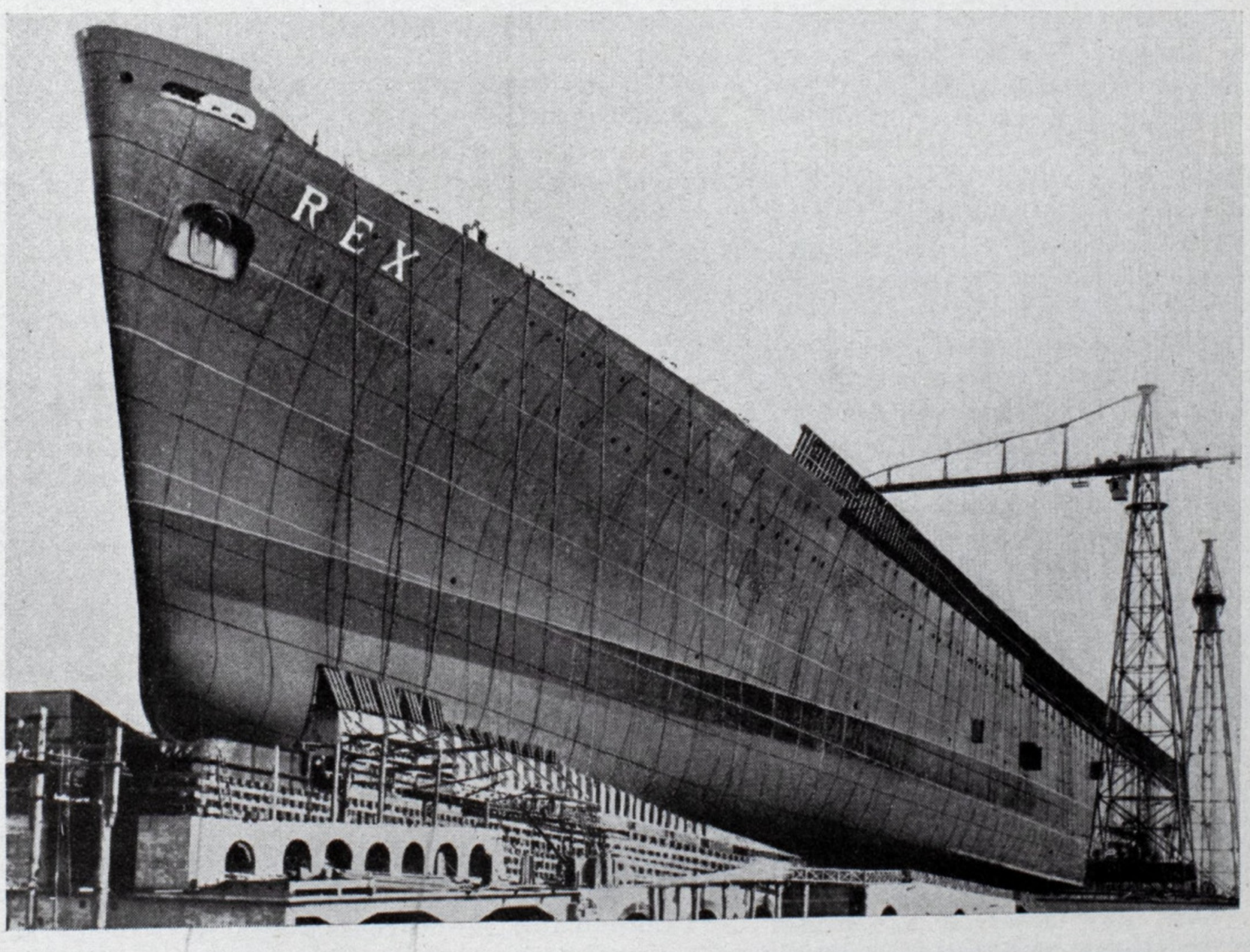
The builders have tried to give the ship as large free spaces as possible. Six of its eleven decks run the whole length of the ship, 880 feet. The first class dining room is 7000 square feet in area.

The rudder and mechanism weigh 100 tons. A single boiler weighs 80, the anchor and chain, 160, the paint and varnish used, 200 tons.

Launch Italian Super Liner Rex at Sestri

THE steamship Rex, largest vessel of the Italian merchant marine, launched at Sestri, Italy, July 30.

The Rex is of about 50,000 gross tons; length, 880 feet; total height, 121 feet 6 inches. This vessel was constructed in 15 months. With an anticipated speed of 27 miles per hour, the passage from New York to Genoa will be made in 7 days.



Chapman Interests Likely To Retain U. S. Lines

Definite favorable action on the revised plan for the reorganization of the United States line, as submitted by Paul W. Chapman on Aug. 18, is expected at the regular weekly meeting of the United States shipping board in Washington on Aug. 26. Arrangements have been made for attendance at the meeting by all seven members of the board, several of whom were away from Washington. Chairman T. V. O'Connor, following a conference with President Hoover at the White House on Aug. 20, said that he had laid before the President the United States lines' situation, including negotiations covering the reorganization of the present operating company. It is believed that the President has no objection to the board's acceptance of the plan submitted by Mr. Chapman.

The offer made by Paul W. Chapman and his associates, R. Stanley Dollar, president of the Dollar lines, and Kenneth D. Dawson, head of the States Steamship Co., backed financially by Herbert Fleischhacker, San Francisco banker, was to pay the government $3,170,900 for its equity in the United States lines providing the shipping board resumes ownership of the LEVIATHAN with the understanding that the ship be returned to the new company which, at its own expense, would undertake to run the vessel for at least five trips a year.

The International Mercantile Marine interests bid $3,000,000 for the United States lines and offered to take title to the LEVIATHAN, flagship of the fleet, and operate her for seven trips a year.

The difference between the two propositions regarding the LEVIATHAN, it is understood, is reconciled in the revised plan submitted to the shipping board by the Chapman interests, although the details of the revised plan have been withheld pending its consideration by the shipping board.

Shipping in Port of New York Continues to Lead

Items developed through the bureau of commerce of the Port of New York Authority show that the shipping industry contributes $225,000,000 a year to the prosperity of the port of New York.

This sum goes to operators of port facilities for such purposes as berthing, towing, piloting, fueling, provisioning and repairing of ocean-going ships. No allowance is made in this total for the sums expended by passengers and for freight brought and taken out of the steamships or for various other intangibles.

Despite curtailed schedules, the port of New York still maintains its lead with at least one sailing per week to every foreign port of importance. On one Saturday early this summer, sailings approached a hundred. In 1929 over 20,000,000 short tons of coal were loaded on vessels at New York.

What the British Are Doing in Shipbuilding

THE latest returns from the Scottish shipyards show that only one small contract was booked in the last month and the tonnage launched on the Clyde was little more than half of the normal output for July. There are now very few vessels nearing the launching stage and by the end of the autumn the Cunarder at Clydebank will be the only ship of importance left on the Clyde stocks. The contract placed during the month is a 350-ton ferry steamer which Harland & Wolff of Govan are to build for the Wallasey council.

* * *

THE largest vessel built on the Tees, the VESTFOLD has successfully completed her trials and a speed has been claimed considerably in excess of the contract. It has been built by the Furness Shipbuilding Co. Ltd. Specially designed for the whaling service at a port in Norway she is one of the largest vessels ever constructed for the carriage of oil and about 8000 tons of steel made in the local steelworks is incorporated in her structure. She is 550 feet long with a maximum deadweight of about 22,600 tons.

* * *

A VERY welcome shipbuilding order has been placed in west Hartlepool where not a single berth in the shipyards has been occupied for some months. W. Gray & Co. Ltd. have now received a contract from Sir Robert Rockner & Co. Ltd. for a 9000-ton cargo steamer for the St. Lawrence river trade. When Rockner & Co. Ltd. acquired in April two steamers from the Dominion Shipping Co., Sydney, Novia Scotia which are engaged in the St. Lawrence coal and ore trade a condition of the purchase was that a third steamer should be built for the same trade and Rockner & Co. undertook that responsibility.

* * *

SWAN HUNTER & WIGHAM RICHARDSON LTD. announce the receipt of an order from foreign owners for a fast passenger steamer of about 5000 tons gross. The vessel is to be built in their Neptune yard, Walker-on-Tyne.

* * *

SWAN HUNTER & WIGHAM RICHARDSON LTD. of Wallsend-on-Tyne have finished the construction of the great floating dock which marks the jubilee of the harbor board of Wellington, New Zealand. The dock will be towed in one piece over a voyage of 13,500 miles which will be the longest tow on record and is expected to last about seven months. The route will be by Gibraltar, the Suez canal Indian Ocean, Malacca Strait, the Dutch East Indies and Torres Strait between New Guinea and Queensland.

* * *

ANOTHER long tow is involved in the transport of a floating crane built by the Furness Shipbuilding Co. Ltd. at Haverton Hill on Tees which is destined for the South African railways and harbor administration. The vessel which was launched in a completed condition with the exception of the jib is a nonpropelling type pontoon with a length of 160 feet, beam 55 feet, depth 12 feet and is built to Lloyds A. class crane pontoon for harbor service under special service. The pontoon is destined to carry a 60-ton electrically operated crane and the shell plating has been increased above the classification requirement to resist the heavy corrosive action of South African waters. The shipbuilders have already completed several large pontoons including that for the 250-ton crane now operating in Southampton Harbor.

* * *

NATIONAL SHIPBUILDERS SECURITY LTD. announce that eight shipyards on the northeast coast with a total of 39 berths and a maximum annual output capacity of 276,000 tons are being purchased by the company for scrapping. It is believed that negotiations are proceeding for the purchase and dismantling of several more shipyards on the Clyde, all establishments of moderate size. Until recently the yards dismantled by this concern have been all on the Clyde where three important establishments have been taken over and closed down thus reducing the number of building berths on the river by over a score.

Inspect Gyro Stabilizer for New Italian Destroyer

Naval attaches of the great powers recently witnessed the trials at South Philadelphia of a 40-ton stabilizing device soon to be installed in the new 2000-ton Italian destroyer leader PIGAFETTA, now under construction in the Royal Italian navy yard at Spezia, Italy. On completion the PIGAFETTA will be the most modern and efficient warship of its type in the world, and engineers predict that it will be watched closely for new records of accuracy in naval gunery as a result of the stabilization.

The big gyroscopic machine with a 20-ton rotor was designed by engineers of the Spery Gyroscope Co., Brooklyn, and constructed at the South Philadelphia plant of the Westinghouse Electric & Mfg. Co.

Although the experts evidenced deep interest in the increased efficiency of operation and the greater maneuverability which the gyro-stabilizer will achieve for the Italian destroyer leader, special attention was centered on the prospects for far greater accuracy of gunfire. Engineers pointed out that with the gyro-stabilizer eliminating the heavy rolling in rough weather, gunners on the PIGAFETTA should be able to approach new records in naval marksmanship. They also explained how in a calm sea the ship can be rolled at will by the gyro-stabilizer to increase gun elevation and range.

Heading the inspection party at South Philadelphia was Capt. L. N. di Villarosa, naval attache of the Royal Italian embassy at Washington.

During the trial and inspection of the gyro-stabilizer, R. E. Gillmor, vice president and general manager of the Sperry company, and R. B. Lea, manager of the marine department, described the huge device and its action. The rotor, a 38,000-pounds steel flywheel, is 91 inches in diameter and 22 inches in thickness at the rim. The maximum speed of the great wheel is 1350 revolutions per minute, giving a peripheral speed of 32,000 feet per minute. The rotor, they said, was so carefully machined that only 7½ ounces of weight change was made on one side to assure accurate balance and smooth operation.

With installation of a gyro-stabilizer aboard ship, a law of nature as universal as gravitation is definitely harnessed. The law is one which alike holds up the small boy's spinnig top and all the whirling planets. Scientists call it the law of precession. It it the power of a spinning body to resist strongly any force tending to change the palne of its rotation. Since it is a peculiarity of precession that if the tilt is fore and aft the gyro can be applied to ships to counteract the motion of the sea's waves.

The sensitive gyro does not wait until a wave has reached the full force of its motion to act. Before the human sense can detect the beginning of the roll, the gyro has caught the movement and gone into action. Thus, the gyro-stabilizer, operating on a principle of prevention, exerts anly sufficient energy to counteract the wave and stabilize the ship. Virtual elimination of sea-sickness is only one of the many everyday uses of the gyro-stabilizer at sea. It also saves power, a 20-degree roll figuring equal to a 10 per cent loss of power.

New Freighter for Ford Has Successful Trials

The EDGEWATER, one of the two 300-foot cargo ships built for the Ford Motor Co. at River Rouge, Mich., was given her official trials Aug. 7 on Lake St. Clair and developed 13 miles an hour under ballast equivalent to full-load conditions.

The tests, made under the supervision of Capt. O. H. Johnson, superintendent of marine construction at the Ford plant, and of W. M. Rice, vice president of Henry J. Gielow Inc., designers of the twin vessels, showed that the boat would stop in one and a half times its own length, that it would virtually turn on its own stem with the aid of dual rudders and that the pair of 800-horsepower turbines could be reversed in nine seconds.

The craft was loaded Aug. 10 and made her first trip to Edgewater, N. J. She was designed for operation on the barge canal, and it is reported that she and her sister ship are the forerunners of a big fleet of vessels which the Ford company will operate on the New York state waterway.

The giant dirigible AKRON, building for the United States navy by the Goodyear Zeppelin Corp., was christened by Mrs. Herbert Hoover at Akron, O., on Aug. 8. The new ship is now being groomed for her preliminary trials, which will be held in the near future. Lieutenant Comdr. Charles E. Rosendahl is in command.

The port of Baltimore chapter of the Propeller Club of the United States was formed June 11.

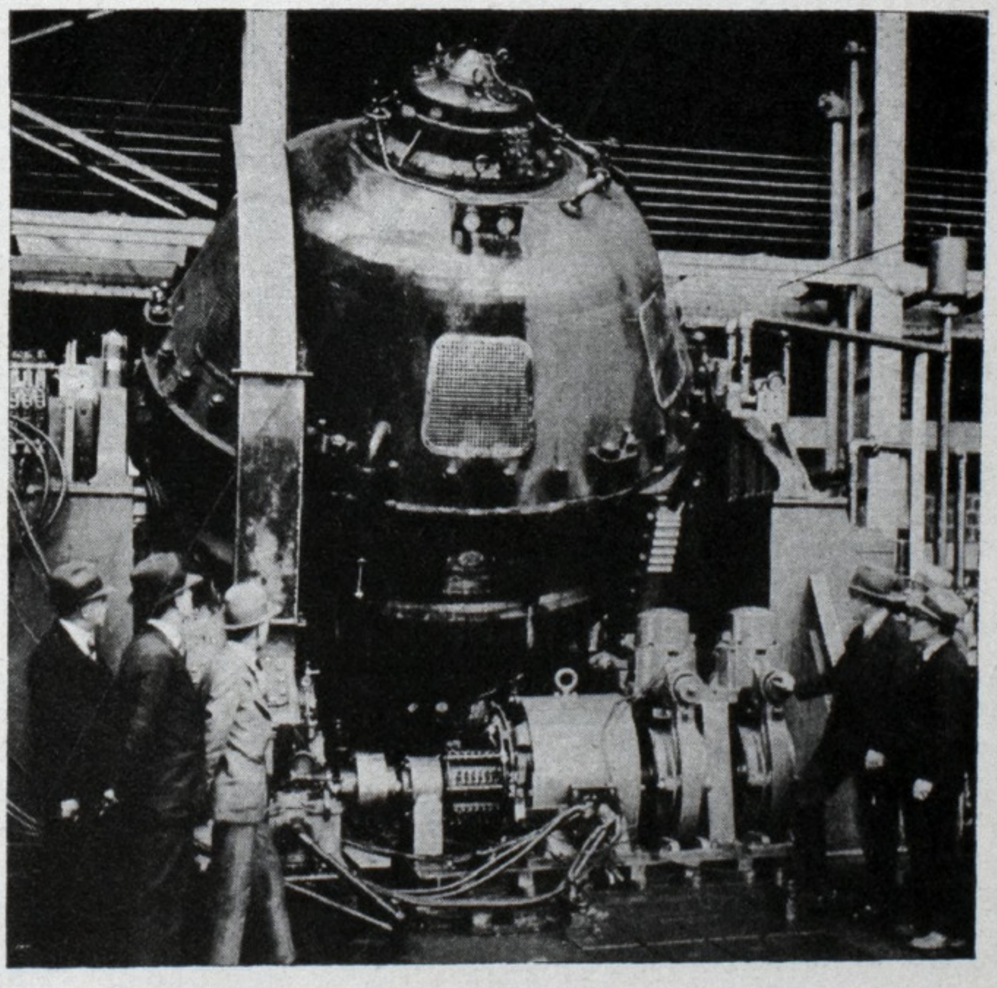
Experts View Test of Mammoth Gyro-Stabilizer

AN 11-foot gyro-stabilizer, weighing 120 tons and designed to prevent rolling of a ship in a sea was tested early this year before prominent marine architects and engineers at the South Philadelphia works of the Westinghouse Electric & Mfg. Co.

The huge "top," weighing 110,000 pounds, spins at a speed of 930 revolutions per minute within the stabilizer casing, spun by a built-in 200 horsepower motor. The stabilizer was built by the Westinghouse company to the order of the Sperry Gyroscope Co., New York, for a foreign shipbuilder.

Engineers at the test said the gyro, precessed by an external electric motor of 75 horsepower, would keep a 450-foot ship within two degrees maximum roll. Almost an hour is required to get the 55-ton rotor up to its speed, and when power is cut off the rotor, it will revolve of its own momentum for more than two hours. The stabilizer is one of the largest ever constructed. A smaller one, now completed as noted in the item at the top of this page, was ordered by the Italian government for a destroyer leader.

A separate turbo-electric power plant of 360 kilowatts is required to operate the large stabilizer.



Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review

By Harry Bowne Skillman
Attorney at Law

WHEN a vessel is leaving her dock she gives notice thereof, if she performs her duty, by a long blast of her whistle, and knowledge that the vessel is about to leave dock or is maneuvering preparatory to getting on her course has usually been held ground for application of the special circumstance rule 27.—CITY OF CAMDEN, 44 F. (2d) 711.

* * *

WHERE charter and bills of lading are silent as to what would constitute delivery, proof of the custom and usage of the port was properly permitted.—Richardson & Sons, Ltd., v. Jenkins Steamship Co., 44 F. (2d) 759.

* * *

THE neglect contemplated by law exempting a ship owner from loss to cargo by fire is the ship owner's own personal neglect; it is not that of an agent, employe, or servant of the shipowner. Failure to provide a seaworthy vessel or competent crew is the personal neglect of the shipowner, and debars him from benefit of such law.—Charbonnier v. United States 45 F. (2d) 166.

* * *

SEAMEN consenting to a longer voyage than that for which they contracted, and receiving pay without delay, held not entitled to penalty under section 4529 of the revised statutes of the United States respecting time for paying wages.—CARIBBEAN, 45 F. (2d) 245.

* * *

A TUG having a vessel approaching on a crossing course on starboard was under the duty to keep out of the way, and inexcusable failure to do so constituted negligence. A privileged vessel, though bound to act prudently, which, of course, includes both the kind and time of action, to avoid collision, even though the burdened vessel was at fault, had the right to believe that the burdened vessel would comply with the rule and to act accordingly in keeping her own course and speed until she had notice that the burdened vessel was trying to go ahead of her.—FRED B. DALZELL, JR., 45 F. (2d) 580.

* * *

A LABORER in the hold of a vessel assisting in unloading sugar was a seaman within the Federal Employers' Liability act, it was held in the case of American Sugar Refining Co. v. Nassif, 45 F. (2d) 321. Quoted the court: "We cannot believe that congress willingly would have allowed the protection to men engaged upon the same maritime duties to vary with the accident of their being employed by a stevedore rather than by the ship. The policy of the statute is directed to the safety of the men and to treating compensation for injuries to them as properly part of the cost of the business. If they should be protected in the one case they should be in the other. In view of the broad field in which congress has disapproved and changed the rule introduced into the common law within less than a century, we are of the opinion that a wider scope should be given to the words of the act, and that in this statute 'seaman' is to be taken to include stevedores employed in maritime work on navigable waters as the plaintiff was, whatever it might mean in laws of a different kind."

* * *

THE bargee is the agent of the owner charged with taking care of the lines of the vessel. The duty, as between barge owner and consignee, to get out proper lines rests on the owner, and failure of the bargee to perform that duty constitutes negligence. —BARTLE DALY, 45 F. (2d) 603.

* * *

NEGLECT of any barge to carry an anchor is a statutory fault, it was said in the case of BARTLE DALY, 45 F. (2d) 605, and each barge, or its owner, is subject to the same liability that would have been imposed had an anchor been carried and not used. The failure to drop an anchor would, however, only be a fault if the use of anchor would have done any good, because only in that event would the failure to act have contributed to the injury.

* * *

ALTHOUGH the overtaking vessel in the Neches river, a few miles below Beaumont, Texas, was the burdened vessel, and though assent to being passed is not tantamount to an assurance by the overtaken vessel of the safety of the attempted maneuver, nevertheless the overtaken vessel has a duty of her own to perform in the first instance which is a condition precedent to her being absolved from liability, which duty, it was held in the case of VARANGER V. DORA WEEMS, 45 F. (2d) 608, is that she must not acquiesce in a desire on the part of the overtaking vessel to pass if her (the overtaken vessel's) pilot or master actually knows, or has reasonable cause to believe, that such passing is fraught with positive danger to either or both vessels. In the same case it was declared that river and harbor pilots are chargeable with a high standard of skill and care in navigation, and that even though their services as pilots be compulsory upon the vessel, their negligence is nevertheless imputed to the vessel; and, further, that a vessel which accepts an unwise signal does not thereby excuse the other vessel from fault if the dangerous maneuver results in an accident. It is important to bear in mind always, said the court, the vital distinction between mere difficulty and actual danger. No master or pilot, whether he be in charge of a favored or burdened vessel, has a right to acquiesce in a maneuver which he knows is inherently so dangerous that it is not likely to be accomplished with safety to both vessels. He may acquiesce, however, if the maneuver can, in his judgment, be accomplished with safety to both vessels, although to do so will require an unusually high degree of skill.

* * *

IN ORDER to render a tug liable for loss of barge and cargo, the libelant must show not merely an error of judgment on the part of the navigator, but the lack of that degree of prudence that one having ordinary maritime skill and experience would have exercised under the circumstances. But it is obvious, it was observed in the case of A. L. WALKER, 45 F. (2d) 621, that in the case of a tug burdened with three barges on a coastwise voyage, one having ordinary maritime skill and experience would give heed to all available sources of information as to weather conditions, including not only those discernible by the navigators of the tug, but also the radio, the bulletins, and signals of the United States weather bureau and the barometric readings.

* * *

It is well established that a contract enforceable in admiralty must be wholly maritime. * * The rule that a contract, to be maritime, and therefore within admiralty jurisdiction, must be "wholly maritime," means that the principal subject matter of agreement gives character to the whole.—NAVIGADORA No. 73, 45 F (2d) 639.

* * *

IF A TUG asks a tow to depart from statutory rule for the convenience of the tug and those in charge of the barge acquiesce, both vessels are responsible for resultant damage not clearly shown to have been due to causes independent of such statutory fault.—ASFALTO, 45 F. (2d) 857.

* * *

WHERE the fault of one vessel is glaring, the fault of the other vessel will be closely scrutinized before she is herself held at fault. In the instant case the privileged vessel was held at fault in not reversing immediately on checking speed because the burdened vessel continued on course without answering signals.—BENGALLA, 45 F. (2d) 864.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	538	2,626,814	563	2,754,107
June	541	2,747,134	526	2,596,749
May	478	2,434,601	511	2,542,351
April	496	2,538,201	527	2,656,992
March	494	2,396,654	489	2,323,422
February	439	2,127,771	484	2,261,468
January	486	2,417,338	542	2,533,711
December	539	2,497,454	521	2,454,917
November	485	2,194,780	470	2,144,883
October, 1930	530	2,546,629	548	2,636,414

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	76	201,677	59	155,114
June	75	218,611	50	127,906
May	82	235,108	62	170,497
April	68	189,113	51	136,433
March	65	198,848	46	116,786
February	69	200,212	53	163,134
January	76	227,146	49	158,570
December	80	206,778	55	144,471
November	87	226,006	46	122,107
October, 1930	85	231,460	53	144,530

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	131	362,111	94	290,733
June	130	347,787	97	264,467
May	108	311,171	91	293,146
April	107	292,403	89	233,756
March	97	279,797	66	243,377
February	76	259,402	57	190,598
January	76	245,382	49	195,091
December	91	287,347	50	174,971
November, 1930	77	248,220	61	232,826

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	.....	.....	.....	.....
June	17	28,216	17	26,397
May	12	20,821	11	22,573
April	11	30,000	10	25,765
March	6	20,081	7	20,122
February	18	48,722	15	45,664
January	14	40,247	15	46,602
December	23	55,605	23	60,126
November	21	46,182	20	40,916
October, 1930	17	41,667	20	45,989

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	6	25,062	7	30,748
June	6	21,104	3	12,211
May	9	37,120	2	8,674
April	8	32,848	6	25,101
March	5	18,288	4	17,400
February	9	43,707	8	30,036
January	8	28,019	5	15,335
December	9	36,380	6	25,318
November	13	46,927	5	18,597
October, 1930	10	37,269	5	22,305

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	28	107,694	48	174,226
June	30	116,953	35	139,799
May	24	94,695	39	142,847
April	26	104,099	36	141,036
March	41	158,869	46	173,220
February	24	95,726	43	175,697
January	29	119,686	47	192,455
December	27	107,300	52	197,628
November	30	122,020	53	208,266
October, 1930	40	155,991	54	207,118

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	125	393,553	120	379,526
June	127	376,049	114	338,066
May	110	353,301	118	368,874
April	131	409,907	139	420,594
March	123	385,514	107	336,157
February	99	327,516	106	340,771
January	121	386,924	127	412,306
December	120	390,126	127	429,048
November	116	384,877	117	376,725
October, 1930	139	452,905	127	402,155

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	31	77,082	63	149,665
June	39	108,710	59	167,488
May	22	63,739	49	140,356
April	14	31,959	40	116,565
March	19	47,982	52	137,616
February	15	43,123	46	116,116
January	21	57,883	61	170,594
December	44	92,341	63	174,384
November	22	65,716	56	141,242
October, 1930	21	72,517	58	153,410

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	.....	.....	.....	.....
June	11	24,902	13	24,517
May	8	21,046	7	11,045
April	15	31,901	5	10,614
March	10	17,299	6	7,839
February	7	18,934	9	20,915
January	14	28,243	10	15,617
December	17	33,862	16	29,847
November	14	30,105	10	13,048
October, 1930	14	27,810	14	27,016

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	39	59,268	41	62,526
June	63	81,660	63	86,349
May	83	91,683	80	90,758
April	60	55,493	51	54,656
March	60	69,731	56	72,956
February	61	70,169	56	69,443
January	61	82,218	57	80,394
December	56	71,327	56	75,588
November	49	63,307	50	64,389
October, 1930	50	61,288	49	60,432

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	.....	.....	.....	.....
June	88	197,952	93	217,151
May	103	194,198	93	194,198
April	107	251,402	108	242,685
March	109	232,778	102	229,966
February	93	222,163	86	206,376
January	112	282,874	111	249,375
December	91	208,802	84	194,477
November	106	241,663	99	220,755
October, 1930	99	187,035	92	196,893

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	46	207,651	50	222,816
June	52	220,915	52	223,750
May	43	185,945	43	184,118
April	50	214,534	48	210,117
March	47	207,105	49	212,237
February	48	212,187	53	233,121
January	54	238,037	60	266,744
December	56	240,203	61	256,724
November	59	255,728	57	245,592
October, 1930	57	246,957	63	272,114

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	184	539,810	172	509,475
June	193	561,399	190	562,090
May	185	532,046	192	551,459
April	195	576,251	181	536,678
March	185	545,474	188	537,148
February	159	499,643	172	537,813
January	207	610,472	190	548,267
December	203	602,527	197	578,723
November	187	555,053	194	541,671
October, 1930	218	633,652	228	672,782

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
July, 1931	.....	.....	.....	.....
June	.....	.....	.....	.....
May	.....	.....	.....	.....
April	17	45,890	19	50,033
March	15	36,938	12	27,110
February	14	33,837	16	37,092
January	20	47,334	21	49,516
December	22	62,668	23	66,852
November	23	63,701	24	65,492
October, 1930	19	47,530	27	74,815

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	.....	.....	.....	.....
June	.....	.....	.....	.....
May	27	53,091	69	191,632
April	26	62,924	68	210,315
March	25	39,536	69	205,341
February	23	40,825	71	209,057
January	25	45,442	84	260,555
December	40	97,907	91	282,726
November	27	58,099	101	303,748
October, 1930	25	47,967	111	339,152

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	170	622,694	176	636,440
June	179	659,029	149	568,208
May	210	696,717	194	731,392
April	225	644,178	209	626,590
March	224	602,763	210	623,023
February	181	557,981	196	561,570
January	191	673,620	193	753,720
December	227	654,598	184	596,347
November	219	618,855	206	616,266
October, 1930	236	680,430	217	628,733

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	173	743,588	155	679,657
June	159	663,047	155	634,838
May	161	658,525	163	676,789
April	158	733,902	170	702,433
March	156	642,924	139	544,316
February	142	577,019	143	581,775
January	165	685,851	172	721,042
December	154	646,767	174	689,358
November	144	570,715	161	656,424
October, 1930	151	617,143	154	639,552

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1931	35	148,988	45	178,091
June	23	115,140	38	139,102
May	23	101,100	39	152,690
April	32	125,007	47	177,058
March	24	106,838	32	131,470
February	30	130,544	38	152,347
January	26	111,047	37	140,860
December	35	143,585	47	185,757
November	28	105,541	50	178,538
October, 1930	34	136,215	50	182,729

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 67 of 229,481 net tons entered and 62 of 207,608 net tons cleared for the month of July.

Modern Stevedoring and Dock Management

Practical Ways to Cut Costs in Cargo Handling

Conducted by
H. E. STOCKER

Conveyors in Handling Package Cargo Reduce Time and Cut Cost

By H. E. Stocker

CONVEYORS are used in a variety of cargo handling operations. A study of the different kinds of cargo handled under various conditions indicates that when conveyors are utilized after a thorough analysis of the whole of a cargo handling operation, and the design of the conveyors is undertaken by engineers familiar with the various kinds of cargo, marked economies are obtained. Mistakes in the use of conveyors may be both in use and design.

Conveyors have been utilized for only a part of an operation so that the resultant economies were less than those attainable if the conveyor principle was applied to the extent possible under the conditions existing. The reason for the failure to give the best economy is usually due to a lack of thorough study of the operation by men combining a broad cargo handling experience and a thorough knowledge of conveyors and their possible uses. Design of conveyors has been undertaken by men who designed a conveyor so heavy that it could not be used, or one so unwieldy that the time necessary to rig or take down nullified their usefulness.

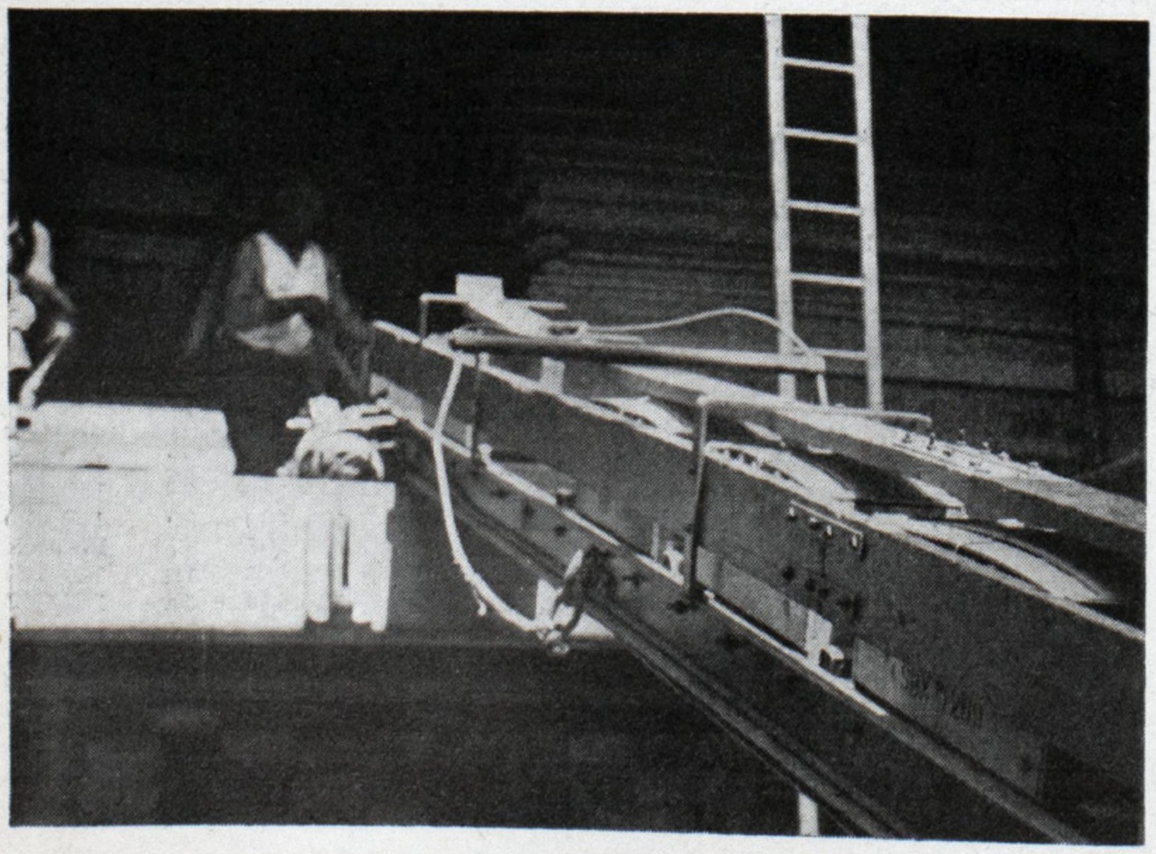
When the whole operation has been planned and operated by competent engineers and stevedores, the value of conveyors has been demonstrated. A cargo handling method is an engineering problem, and engineering knowledge and training and points of view are necessary to achieve the maximum results. The misapplication of engineering knowledge has had the effect sometime of causing practical men to be prejudiced against engineers.

Technical and Practical Features

The problem is to balance the knowledge and ability of the stevedore and the engineer. The decision as to whether or not there is any possibility of using conveyors in any particular operation depends on several factors:

First, the volume of cargo to be handled must be considered; then expense of providing conveyors, the time necessary for rigging, the time that a conveyor may be used in handling cargo in a particular location.

In general, cargo moves either in a continuous flow or in a periodic flow. Trucks and trailers, skid and lift trucks and other power equipment, also hand equipment, are used in periodic operations. Conveyors are for use where a fairly continuous flow is obtainable. In discerning the volume of cargo to be handled by conveyors, uniformity of packages must be considered. However, practical uniformity, not actual, is the important factor. If the packages are not too heavy for the conveyor and if not too large for the conveyor, then a conveyor may be used in most cases to good advantage.



Conveyors in use for Loading Oranges on shipboard at Los Angeles

The use of the screw type conveyors by the Great Lakes Transit Corp. in conjunction with handling cargos was described in the November, 1930, issue of the MARINE REVIEW. This operation is an example of the use of conveyors in handling bagged goods that come out of the ship with bags badly mixed. The bags are dropped upon a sorting table by the belt conveyor that brings the bags from alongside ship. The sorting table consists of a moving belt with a narrow shelf, onto which the bags are pulled by the sorters lined up along the sorting table. The bags are placed on trailers hauled to cars by tractors.

Flexibility of Screw Type Conveyor

The Great Lakes Transit Corp. uses screw type conveyors only at South Chicago for handling bagged freight from cars across the dock to the ship. This operation will be described in detail in a later issue. The screw type conveyor is advantageous because of its great flexibility. Its lightness and ease with which it can be adjusted to turn corners makes it particularly suitable for cargo handling operations.

The effective use of the portable belt conveyor is found in handling bunches of bananas, boxes and hampers of fruits and vegetables, cases of oil and other cargo of approximately the same size.

One line uses a belt conveyor in discharging fruits and vegetables from side port steamers. The wharf is narrow and congested, marks are mixed and packages consist of boxes, crates and hampers. However, these conditions which are sometimes offered as a reason for using hand trucks, do not prevent fast discharging of the cargo at low cost.

The side port conveyors discharge to the dock conveyors. The packages are taken off this by men placed along side the conveyors. The packages are placed on the belt in the ship with the marks up to facilitate this operation. The packages are then placed on electric land carrying trucks or on skids.

This line not only uses conveyors for discharging from the 'tweendecks, but from the lower hold. Short portable belt conveyors with cleats on the belt are used.

After the space in the hold near the conveyor is cleared, additional men are placed in the hold so that the conveyor is profitably utilized.

Since conveyors have been utilized the tons per man hour have been increased, ships' despatch has been expedited, and packages are less damaged than previously.

Conveyors and Trucks Used

Another steamship company utilizes belt conveyors in handling packages of fruits and vegetables out of the ship, but uses hand trucks fitted with trays for handling on the dock. The trucks are lined up along the conveyors and marks separated by piling only one mark on each of the trucks.

In another steamship company ships' time being the most important factor, a conveyor is used to discharge general cargo to the wharf. The cargo is rough piled—sorted after the ship sails. This operation greatly expedited ships' despatch, and costs per ton were also reduced.

Portable belt conveyors are used very effectively on the Pacific coast in loading flour into ships. The conveyor is placed to lead from the pier to the hatch where chutes handle to the hold or 'tweendeck. The flour is brought to the conveyors by means of large four-wheel trucks hauled by gasoline tractors.

The United States department of labor reports that the average per gang per hour for this method is 62.6 tons, which is the highest productivity shown for loading flour in the ports studied i.e., Seattle, Tacoma, Portland, Oreg., Astoria, Galveston, Houston, Port Arthur, Texas Newport News, Va.

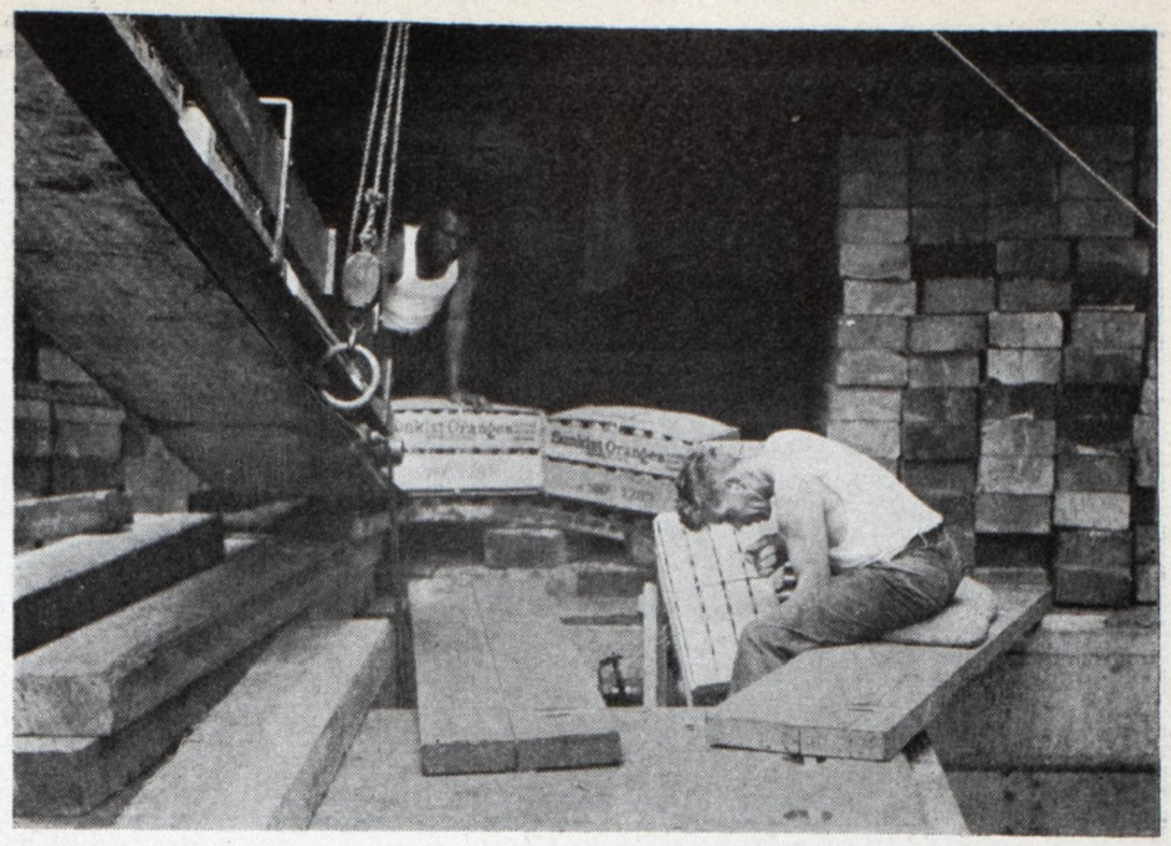
The North Pier Terminal Co. of Chicago uses belt conveyors in handling cargo to and from barges. Costs have been reduced and barges' despatch expedited. Formerly 900 bags of sugar were discharged per hour; now 1500 bags can be handled in the same time.

The Banning Co., Los Angeles, stevedores, use a combination of belt and gravity conveyors in loading boxes of oranges into European-bound ships. Both side ports and hatches are used. At present 750 boxes to 1200 boxes per hour per gang are handled by the conveyors, compared with 450 boxes per hour per gang when using ships gear.

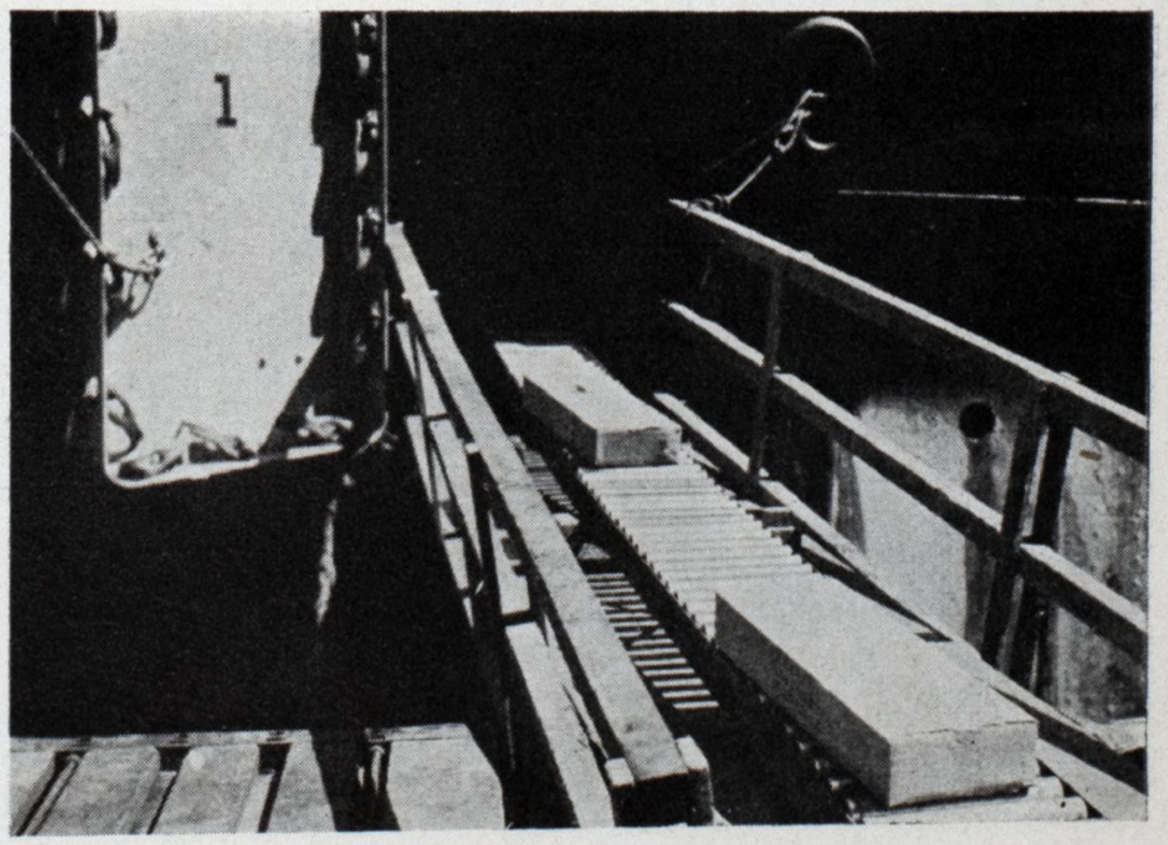
Less Damage to Packages

The chief difficulty in getting a better speed of loading is the time necessary to place dunnage so that the boxes may be properly refrigerated during the voyage. An average cargo of approximately 30,000 boxes of oranges is necessary to justify the use of a conveyor. A big advantage in using conveyors is that there is less damage to boxes; ships despatch has also been expedited.

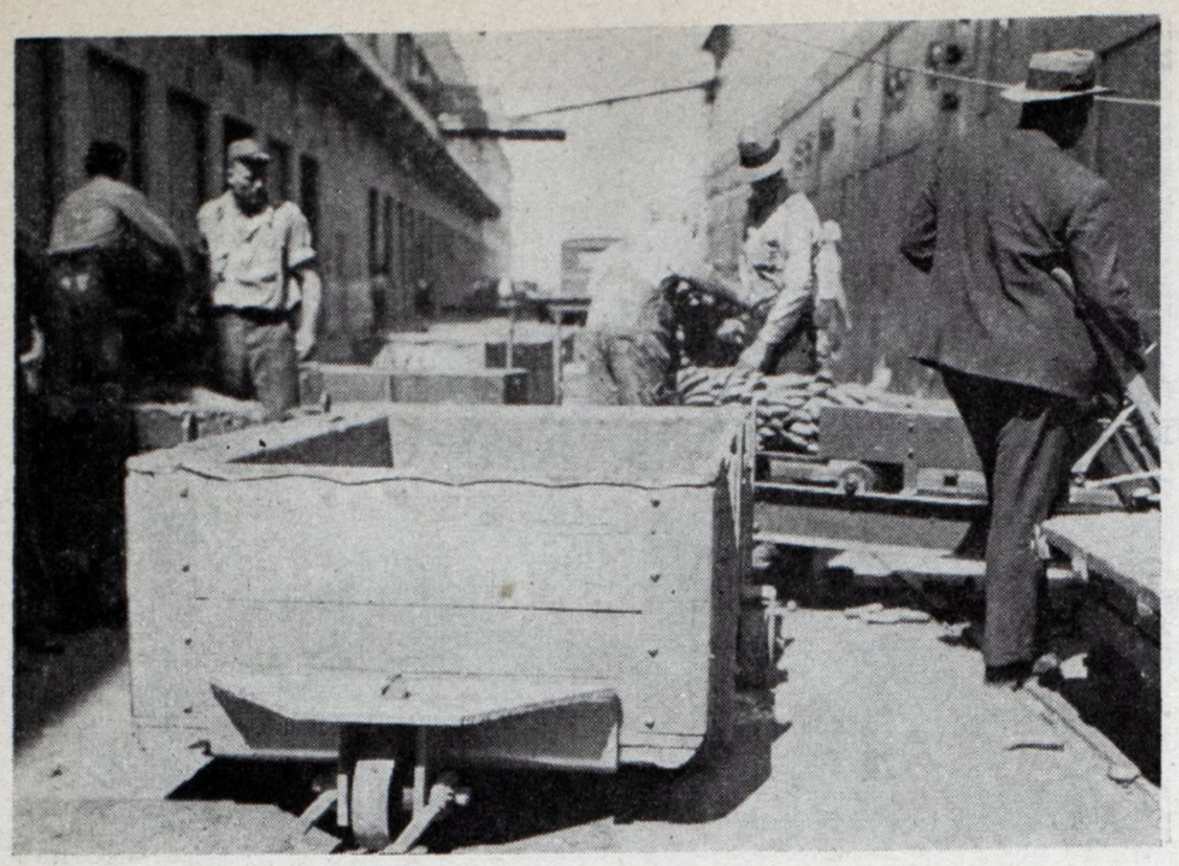
Belt conveyors are used extensively in handling bananas. In some operations the conveyors only handle from the ship through a side port to the pier, where the bunches are picked up by longshoremen and "humped" across the pier to a carfloat unloading to refrigerator cars.



Making a turn in tween decks with conveyor loading oranges.



Gravity roller conveyors are often useful for handling cargo in ships and on Terminals.



Using belt conveyors for discharging bananas at the Los Angeles Docks.

At one terminal in Los Angeles the conveyor delivers to the wharf apron, where the bunches are taken off the belt and placed in a special type padded box truck. These trucks are pulled to the refrigerator cars spotted on the opposite side of the pier, by gasoline tractors.

The pocket conveyor for vertical lifts out of hatches is used in handling bananas at a number of terminals. The chief difficulty with this type of conveyor, except when special equipment is provided to place them in the hatch, is the time necessary for rigging. This can be largely offset where the volume of cargo to be handled is large.

One difficulty in the use of conveyors is carrying cargo across a terminal which is being used also for handling other cargo.

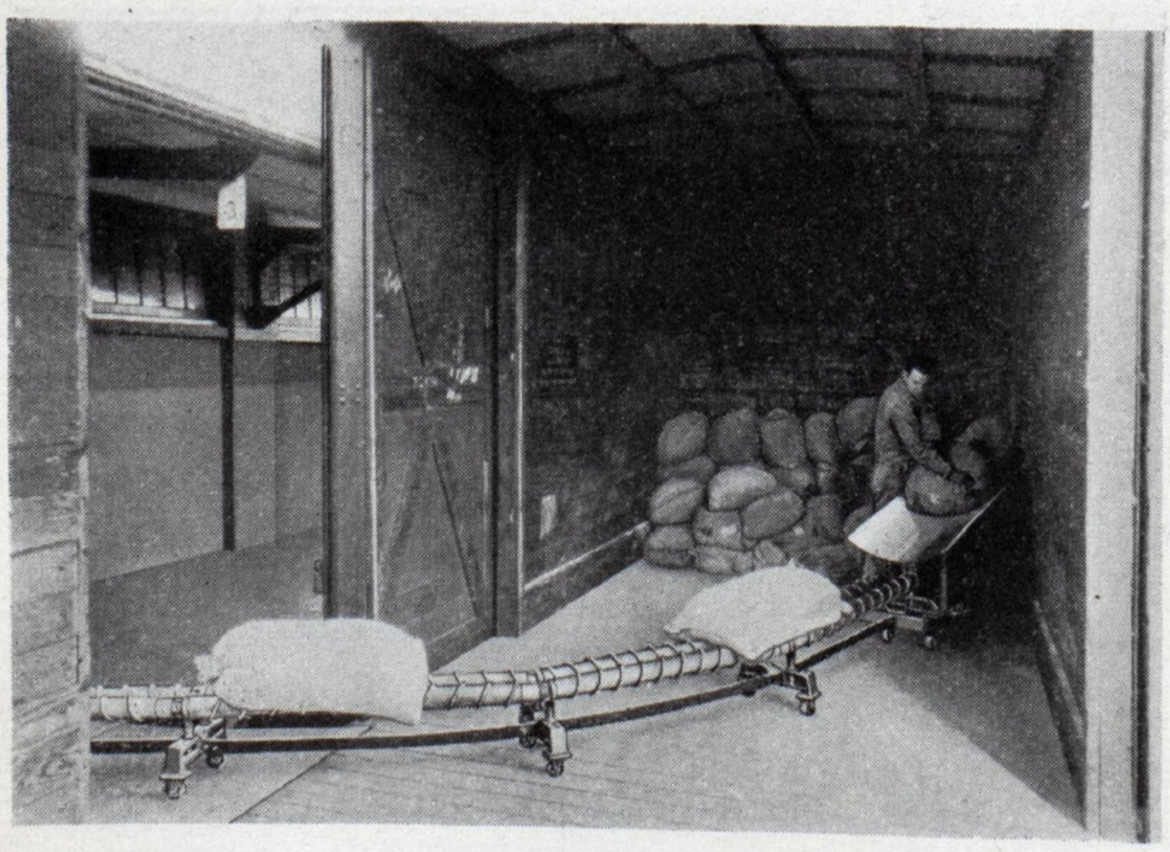
The Great Lakes Transit Corp. at Buffalo surmounted this difficulty by running the conveyors from side ports to an elevated belt conveyor suspended from the roof. These conveyors run down the dock to a sorting table.

At South Chicago, all freight other than conveyor freight, is handled at a different time so the screw type conveyors can be run across the shed floor without interfering with handling other cargo. In still another place, conveyors are carried across the shed on portable staging.

Portable conveyors are being used in handling many types of cargo, for instance, bananas from vessels off shore to lighters alongside of vessel. At the same time practically the same operation is carried on from the starboard side inshore to trucks on the wharf. In this operation there are three lines of movement; one via a long conveyor operating overall direct to runway platform between box car on lighter and two shorter portable conveyors operating directly from two hatches of the upper tween decks through sideports to gangs on lighter. Such equipment will operate successfully with variations in elevation due to tide and light and heavy draft on such commodities as bananas, bags, coffee, sugar, tubs of butter, citrus fruit and mixed package cargo, in either upward or downward direction. For bananas, 100 pound bags of sugar, and similar commodities the rating attained is from 1500 to 2000 pieces per hour.

A difficult problem was solved in the case of the United States Gypsum Co., by the use of a portable conveyor operating from houseboat scow type of vessel in the slip to the warehouse proper. Variations from the horizontal due to tide and light and heavy draft in this case amounted to as much as 40 degrees. The conveyor handles up to 150 pound bags placed lengthwise on the belt at a rate of 1500 to 1800 pieces per hour.

The subject of conveyors is a large one and it is not possible to cover all of it in one article. However, it is planned to have further articles on the subject during the next year because the study of the use of conveyors for handling cargo which the author has made during the past three years indicates that a thoroughly planned job will increase the profitable use of conveyors in many instances; that in other cases conveyors can be utilized where they are not used now if the problem is studied and a plan of operation is worked out by men with combined practical shipping experience and a thorough knowledge of the possibilities of the conveyor method of handling materials.



Screw type conveyor is used effectively in handling bagged cargo from cars into side port ships.

Use of Fibreboard Cases in Export Trade

The percentage of goods packed and shipped in fibreboard cases is continually increasing, according to information tabulated by the Export Fibre board association, San Francisco. Two years ago this international association of fibreboard case manufacturers began unofficially an educational campaign to gain the support of packers for export fibreboard cases and acceptance of the cases by overseas buyers on a parity with fibreboard cases in which home-packed goods are transported abroad. After obtaining the support of a limited number of packers, test shipments were made to European ports from western United States coast ports. Acceptance of the special quality fibreboard shipping cases by overseas buyers and distributors soon followed. Since goods pack easier, ship lighter and occupy less space when handled in these cases, distribution costs are lowered.

H. L. Stilwell, managing director of the association, is at present in Europe observing shipments from the United States, Canada and Australia and setting up a service and educational campaign for warehousemen, freight handlers, etc. Representatives are daily on the docks of important American east and west coast ports inspecting shipments and lending their specialized experience on behalf of shippers and exporters wherever it is needed. One of the most important functions of the association is the establishment of a standard which all export fibreboard cases should meet. Member manufacturers whose quality of cases meets these standards are allowed to print on every case the authorized trade mark of the association. A bulletin entitled "Suggestions for the Proper Handling of Export Fibreboard Cases" is being distributed by the association without charge and is available to anyone interested in the subject.

Pallets and Slings Are Used on Los Angeles Pier

THE McCormick Steamship Co. at Los Angeles has developed an advantageous use of the fork type truck for handling general cargo on a steamship terminal. Pallets or platforms 4 feet by 6½ feet are used. The nature of their construction is shown in the accompanying illustrations. The trucks used are of the high lift truck type, with the platform partly cut away and forks attached. Cargo is received from trucks directly on to the pallets. As seen in one of the illustrations, the empty pallets are piled approximately as high as the floor of the truck to facilitate the handling of the cargo from truck. This method appeals greatly to truckmen because their loads are unloaded quicker and with less fatigue than when the packages are placed on the floor of the terminal. The truckman estimated they would save a half hour in unloading the truck and trailer.

Lifting and Moving Loaded Pallet

When a pallet is loaded the fork on the electric truck is run under the pallet which is lifted clear of the remaining pallets and taken to place of rest in the shed. One decided advantage of this method of receiving cargo is that a truck can unload or load at any place in the terminal and not necessarily at the particular place where the truck load is to be deposited. This reduces congestion and delay and has a good influence from the standpoint of holding and increasing traffic over the line.

Box cars can be unloaded by placing of the pallets in the car after the doorways are clear as the trucks have a short turning radius so they may enter cars without difficulty.

When the steamer starts to load, the truck picks up the pallets and places them on a platform sling which is on a fifth wheel type trailer. The usual trailer train consists of three trailers which are hauled to ship side by a gasoline tractor. The wide apron on the McCormick terminal gives plenty of room for the tractor trailer train to maneuver. The sling is attached to the platform sling and the slingload hoisted into the ship. The empty pallets are placed on empty trailers until a load is accumulated when they are hauled into the shed to be used again. The same is done with the empty platform slings.

Bulky freight, barrels and many other kinds of general cargo are handled on the pallets.

Sacks of alfalfa meal and other cargo are tiered on pallets but flour is piled on the floor of the shed because the flour receivers object to rehandling the pallets.

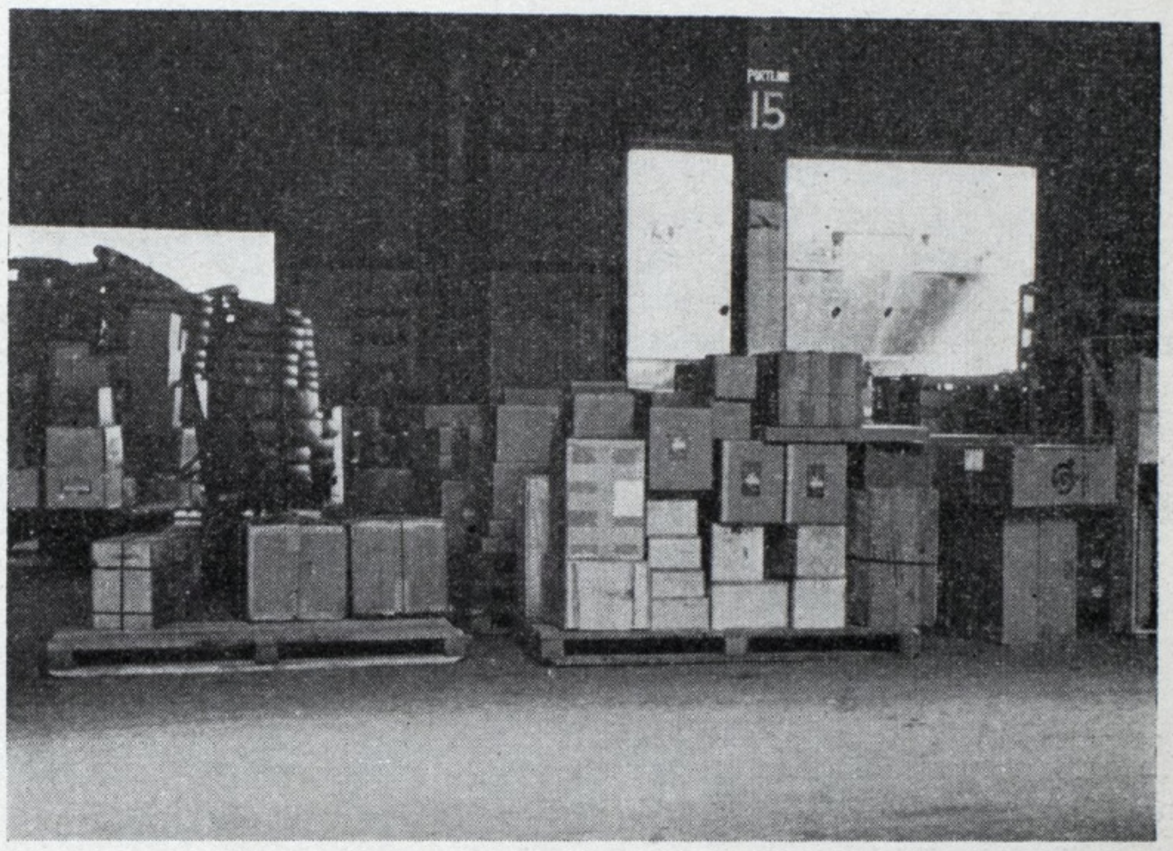
The pallet method of cargo handling reduced stevedore costs, and also reduces damage in addition to the traffic advantages mentioned.

A special type skid has been developed for handling rolls of newsprint paper. The skid is fitted with two cradles which tilt so that the rolls may be placed in the scoop at the lower end of the cradle and then pulled back on to the skid so that the rolls are horizontal.

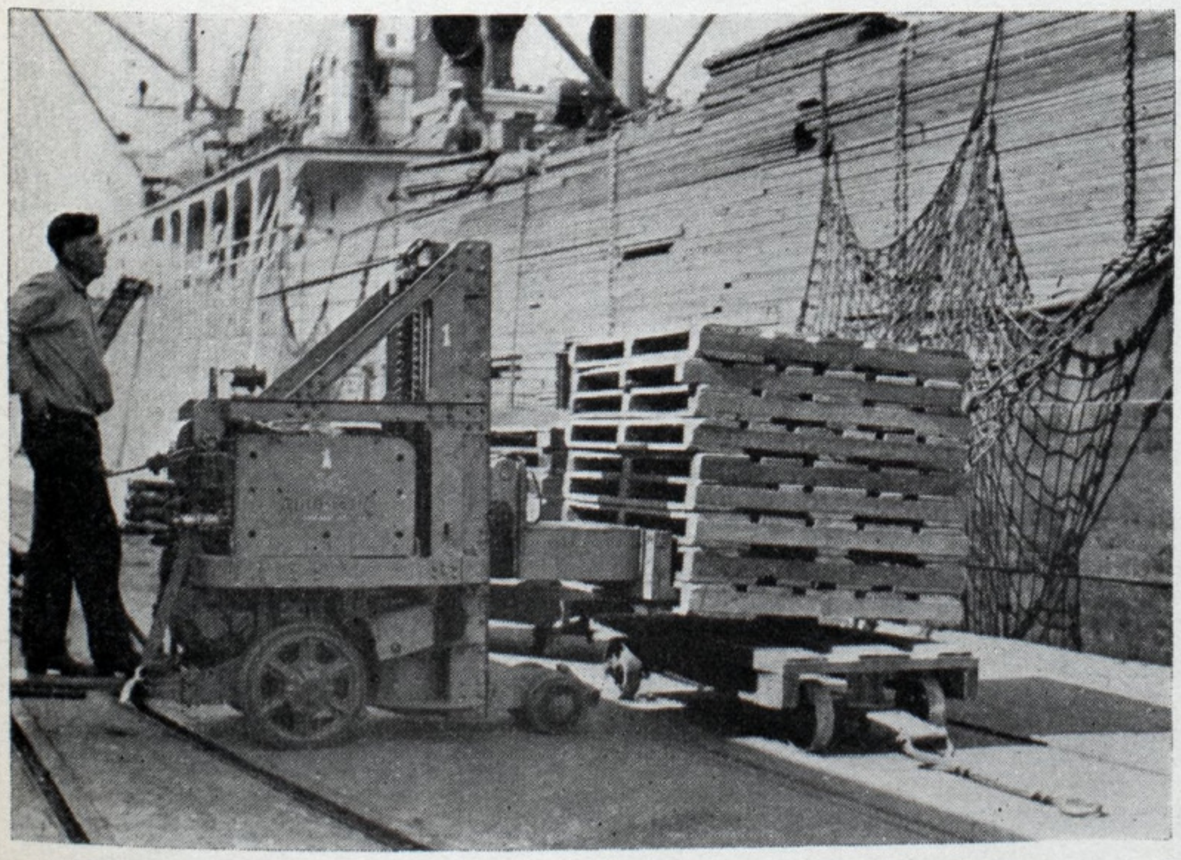
Another interesting development at the McCormick terminal is a rope sling with a special pulley attachment which reduces the wear on the rope sling to a very large degree. It is estimated that $400 per sling per year is saved.

A visitor at the McCormick terminal at Los Angeles is much impressed by the cleanliness of the terminal and the general neat appearance of everything. The cargo is well piled, the gear room is in order and not cluttered with junk and an array of every kind of gear under the sun.

This condition on the McCormick terminal is due to the terminal agent, M. A. Richley and Capt. John Echlund, the chief stevedore, who have co-operated successfully in terminal housekeeping. It is found that good terminal housekeeping is not only good to look at but it saves money in avoidance of waste and reduction of accidents.



Cargo stored on pallets. Electric truck picks up loaded pallets and places on truck or trailer for hauling to shipside.



Electric trucks quickly take empty pallets and platform slings back to the shed for reloading.

Discarding equipment which is economically obsolete and replacing it with the best is true economy.

Ship designers need to give consideration to the effect that horizontal brackets, longitudinal stringers, and other places where dirt can collect, because holds frequently have to be washed out and swept down and places where dirt can collect increases cost and causes delay in this work.

A barge line on San Francisco bay uses the screw type conveyor to load and unload sacked sugar.

Rise of New Ports on Pacific Typified by Olympia, Wash.

By Robert C. Hill

OLYMPIA, capital of the state, is one of the oldest cities in Washington, but it is less than five years since it began to figure as a deep sea port. It is at the head of Puget sound, 167 miles from the Pacific with the wide, deep channels of the sound leading to its very doors.

Public-spirited citizens of Olympia in 1924 decided to obtain for their port the share of deep sea traffic to which its advantageous situation entitled it. The first step was the organization of a Port district. By concerted effort federal appropriations were obtained whereby a channel was dredged to a depth of 22 feet at low tide from deep water into the inner harbor where the proposed terminals were to be constructed. The port issued bonds in the sum of $155,000 for dredging a turning basis. With the material obtained from this operation a fill was made, giving an area covering approximately 33 acres. With this fill as a basis, a comprehensive scheme of port development and improvement was adopted under which a capacity of 24 vessels was provided. For the construction of terminal facilities, a second issue of bonds was sold in the sum of $250,000. An open wharf, 500 feet in length, was built to accommodate vessels loading lumber.

In recent months the government has further improved facilities at Olympia by dredging the entrance channel to a minimum depth of 27 feet at low tide so that with an average tide range of 14 feet the largest vessels can now enter Olympia harbor. The port is also further enlarging the turning basin so that there is now no difficulty in maneuvering any sized deep sea carrier in and out of the port. The Lighthouse service has installed powerful electric lights for ranges marking the center lines of the channels. In addition suitable flashing signals have been placed along the route leading to Olympia.

Port Facilities at Olympia

At the present time Olympia's facilities include the following:

A wharf 1850 feet in length. This terminal is equipped with double ship-side tracks, with crossovers every 200 feet, so that cars can be switched to and from individual hatches without disturbing the operations of other vessels at the wharf.

Transit sheds "A" and "B" of 3000 tons capacity each.

Cold storage "A" of 140,000 cubic feet capacity with special rooms and equipment for freezing and storage of berries, eggs, etc.

An open storage yard of unlimited capacity for storage of lumber and wood products not requiring protection against the weather.

Mechanical equipment consisting of a 30-ton locomotive crane, a 60-ton locomotive, as well as tractors, trailers, elevators and stackers necessary for the economical handling of cargo.

The port owns and operates all of the railroad trackage on its property and maintains switching service at all hours for the convenience of steamship customers.

Deep Sea Tonnage Handled

While the Port of Olympia terminals are the only wharves at which large vessels berth, there is considerable deep sea tonnage handled over another dock in Olympia that is transshipped from other ports by small vessels but at through rates. For this reason the total of 1,322,426 tons, shown in government records, for 1930 is considerably larger than the total over the port's terminals, although the 263 deep sea vessels shown in the port's figures, were the only overseas carriers entering Olympia's harbor.

Illustrating the growth of Olympia, the following comparative figures are furnished, covering only the business handled over the Port of Olympia terminals:

For the Year 1927

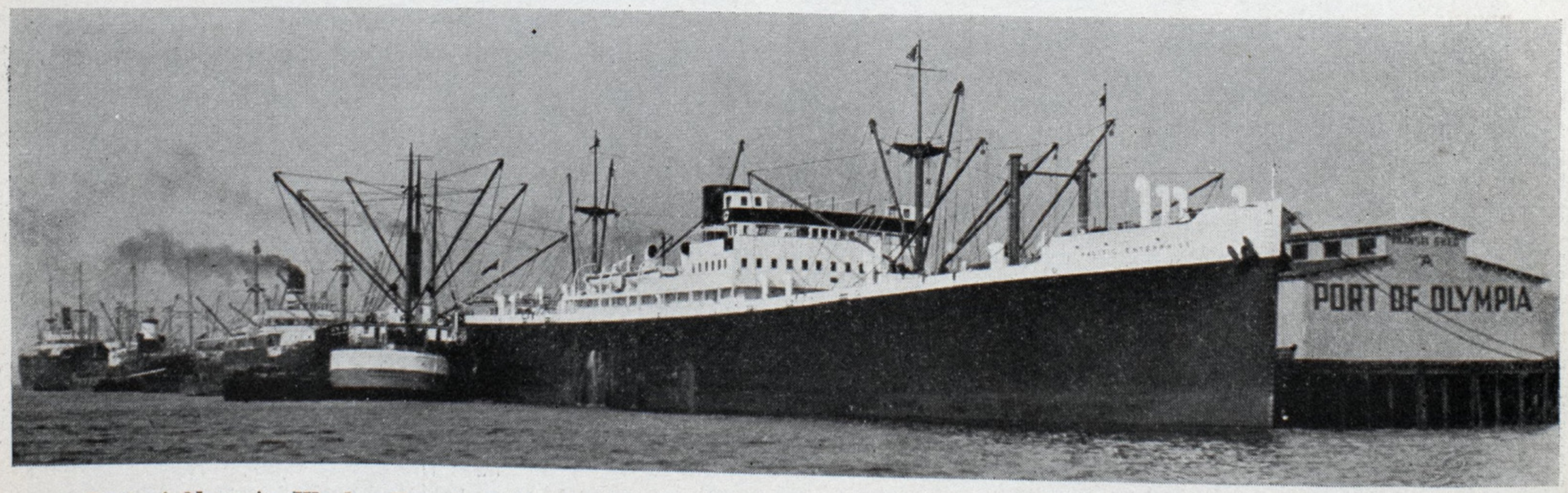
Destination	No. Ships	Gross Tonnage	Lumber Board Ft.	Gen'l Cargo—Tons
Orient	28	149,174	58,069,376	.....
Europe	22	129,122	12,247,637	451
Coastwise	10	17,512	3,284,087	.....
Intercoastal	15	77,815	41,279,680	52
So. Africa	6	26,856	3,863,746	454
Australia	9	39,869	11,410,777	.....
	90	440,348	130,155,303	957

For the Year 1930

Orient	47	296,988	73,123,740	30
Europe	128	785,406	65,454,681	6,796
Coastwise	49	103,544	16,135,047	1,801
Intercoastal	35	200,807	56,819,192	1,115
So. Africa	1	5,425	270,465	.....
So. America	3	15,568	1,425,948	80
	263	1,407,738	213,229,073	9,822

The purpose of constructing the first unit of the Olympia cold storage plant was to accommodate the agricultural industry of Thurston county and relieve the high cost of transporting goods requiring refrigeration to plants at other Puget sound ports. This movement has increased to the point where Olympia's refrigerator facilities are able to accommodate about 25 per cent of the tonnage originating in its own county. Plans are now under way for the building of additional cold storage units so that in the not distant future all the products of the contiguous territory can be held in Olympia. Up to the present only a small tonnage of cold storage products has moved from Olympia by water but it is believed that since definite schedules have been established from Olympia for the large passenger and refrigerated vessels plying to Europe, increasing shipments of perishable cargo will be handled through the port.

The manager of the Port of Olympia is Ernest C. Gribble, who not only laid out the plans for developing the harbor and establishing facilities but has since been successful in obtaining business for the port, which is being conservatively managed with an eye to the future.



Port of Olympia, Wash.—Terminals for Ocean Vessels Built and Managed by Commissioner Appointed by the City

Useful Hints on Cargo Handling

STRINGPIECES often interfere with cargo handling operations. If the wharf apron is narrow, slingloads have to be made up in the shed so that they are delayed in hoisting while the load is steadied by the longshoremen to keep it from hitting the ship's side. If there was no stringpiece the load could be made up close to the ship and this delay could then be materially cut down.

Stringpieces caused delay and expense in unloading and loading lighters, due to the effort necessary to surmount the "hill." The best modern terminals have flush stringpieces so that these difficulties can be avoided. By installing a temporary guard on the dock of the California Hawaiian Sugar Refinery at Crockett, Calif. trucks are prevented from going off the wharf and at the same time keeping slingloads from hitting against the ship's side.

Small pieces of sheet steel are used at some terminals to make a good trucking surface over railroad tracks or rough spots in a dock floor. The sheets are not fastened to the floor so they may be removed when conditions make this necessary.

The Value of New Ideas

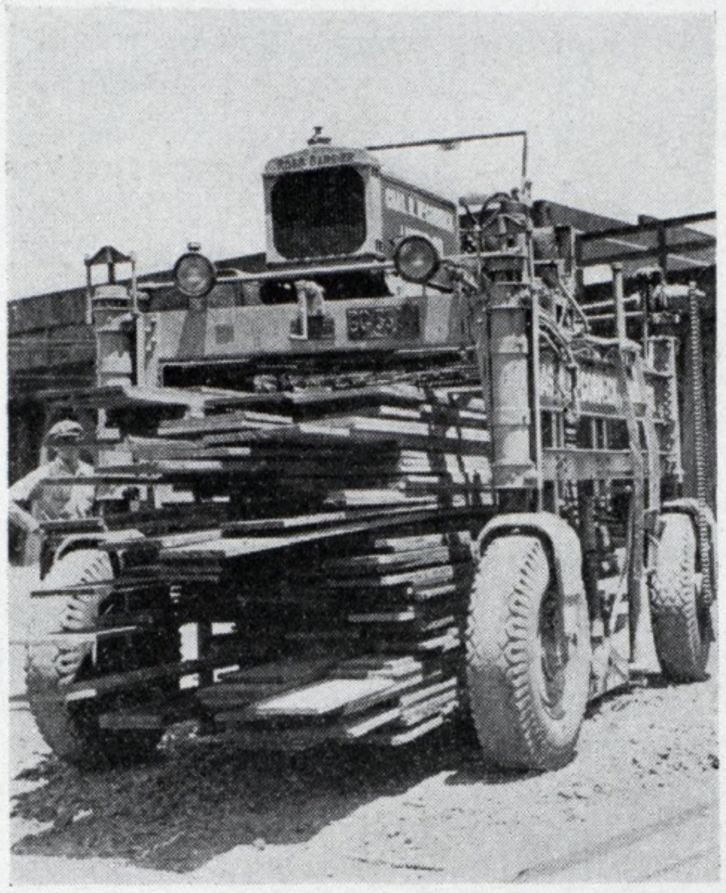
NEW ideas, always the life blood of a business concern, are more so than ever under present conditions where it is vital to increase revenues and to decrease costs. A systematic search for new ideas is necessary if executives are to feel that they are doing everything possible to improve the situation for their companies. A company executive reads this page each month with this thought in mind, knowing that we make a conscientious effort to find profitable ideas for our readers. It has been so successful that he plans to send copies to all of his ship captains for their comments.

Loading refined sugar at Crockett, Calif., the rope slings are returned to the deck by means of a block and tackle rigged on a post at the hatch coaming so that the ship gear is not delayed in handling the cargo. The slings are thrown from the deck to the wharf by the hatch foreman.

Motor trucks fitted with cranes are used extensively on the Los Angeles water front in various cargo handling operations. These cranes are used to unload cast iron pipe from trailers on which it is brought to an area outside the shed where this cargo is stored. Pipe can be handled in this manner economically and without damage.

THIS page is being devoted to short items on all matters having to do with the more efficient turnaround of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.



Pneumatic Tires on Lumber Carrier

Nesting Skid Saves Space

THE urgent need for a collapsible or a nesting type skid platform has been met by the development of the nesting skid shown below for which patent is pending. This permits compact stowage of empty skids when not in use, in much less space than is required for the present type skid.

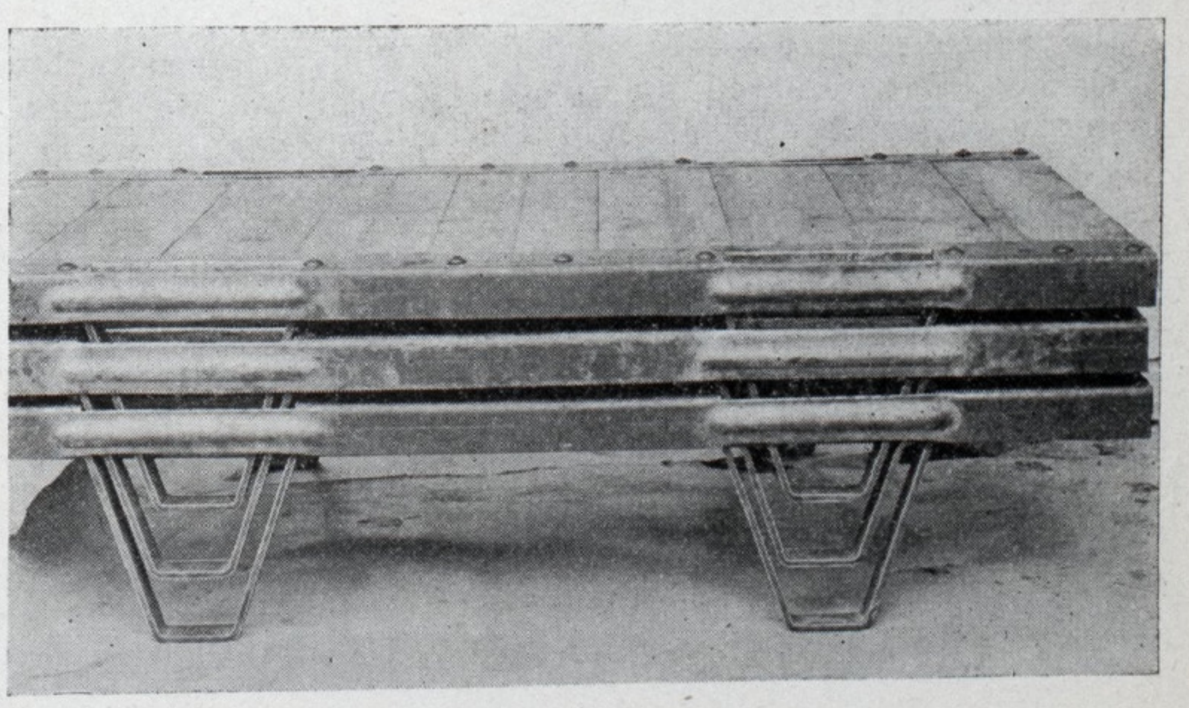
Skid platforms have been used for years to handle goods in and around industrial plants, warehouses and steamship piers. However, one objection, though slight in comparison to the saving made, was the amount of storage space required for stowing the empty skids when not in use, stacked as they usually are back to back to any desired height, usually 5 or 6, requiring 45 to 60 inches.

To overcome this ojectionable feature the nesting skid illustrated and described here has been developed. Its general characteristics are similar to the usual type of skid platform, with wooden top, steel legs and steel side angles. Its specifications entirely conform to those recently established by the skid platform committee of the bureau of standards.

The top of the nesting skid is provided with four openings directly over the tops of the legs into which the legs of a superposed skid nest, which thereby reduces the vertical space between two adjacent nested skids to about 3½ to 4 inches. The guide angles on the under side of the skid serve also as spacers and prevent jamming of the legs. This nesting feature also serves to hold the skids together and prevent toppling when a stack of skids is moved from one place to another, and permits more empties to be moved at one time.

Stowing only 3½ inches apart after the first skid, about 24 can be stored in 8 feet, the height of a standard box car. They are made in all sizes and especially conform to the standard sizes established by the bureau of simplified practice, department of commerce.

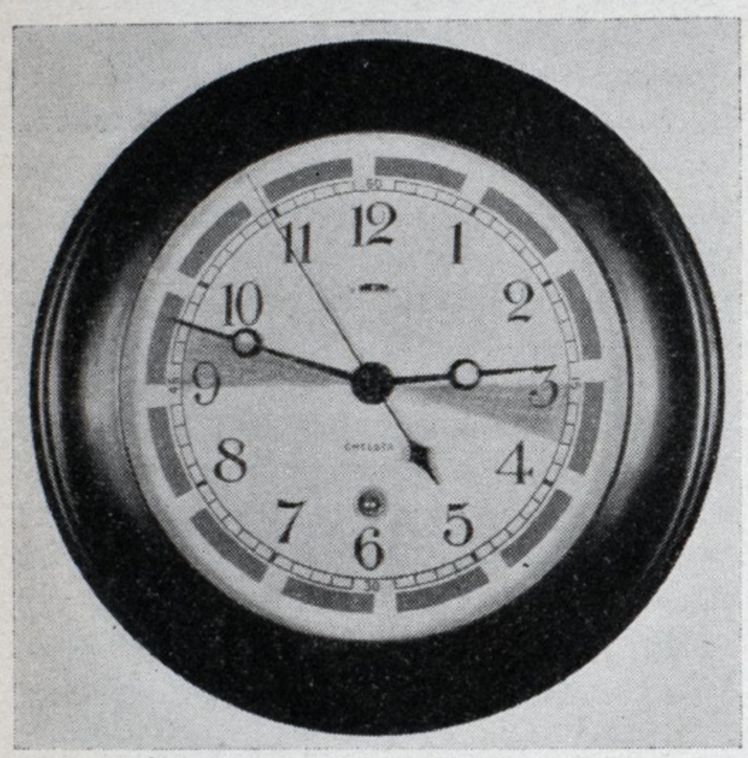
Recently developed nesting skid. Saves space in stowage and holds stacked pile together without danger of toppling when moving.



Equipment Used Afloat and Ashore

Radio Room Clock Developed—Cleaning Compound—Grating—Tension Indicator for Quick Reading—Lighting Ocean Bottom—Pipe Fittings for Welding—Soldering Iron

IN CO-OPERATION with the Chelsea Clock Co., the Radiomarine Corp. of America, 66 Broad street, New York, has developed a special radio room clock. The clock, illustrated herewith, has been especially designed to facilitate transmision of the alarm signal provided by the international radiotelegraph convention and the international conference on safety of life at sea. The



Special Radio Room Clock

alarm signal consists of 12 dashes, each four seconds long, with an interval of one second, to be transmitted during a period of one minute.

The clock is provided with a sweep second hand and special red markings on the dial, making it easy for the operator to accurately time the four second dashes and one second spacing. This is to assist in sending out signals of exactly four seconds' duration in emergency. Such signals, separated by silent intervals of one second, will operate automatic devices in ships within range and call radio operators to their posts if they should not be on watch.

Other special markings are provided to call the operator's attention to the three minute silent periods which must be observed by all radio stations at 15 and 45 minutes past each hour.

The movements are 7 jewelled lever escapement with compensation balance, Brequet hairspring, cut wheels, cut steel pinions, hardened ground and polished.

New Cleaning Compound

A SPECIALLY prepared, highly concentrated paste for cleaning dirt from paint, varnish, lacquer and enameled surfaces has recently been placed on the market by the De Vilbiss Co., Toledo, O. This compound is in semipaste form and may be used on both interior and exterior surfaces.

Cold water from a 1-1 to a 10-1 proportion is used to dilute the preparation to the proper strength for the work to be done. It may be applied by either a spray gun or a brush. After applying it is allowed to set for from five to 15 minutes and then is easily sponged or washed off with a hose. On an unusually dirty job the entire surface is brushed in order to loosen further the dirt before washing. Grass, shrub and other vegetation which may be near the work are not affected by the compound.

The compound is sold in one, five and 50-gallon containers.

New Safety Grating

A NEW slotted floor plate has been developed by the Central Iron & Steel Co., Harriburg, Pa. The new grating is the non-skid type and proof against slipping in any direction. Because of its basic design, it requires no deep recess or rabbet in which to set.

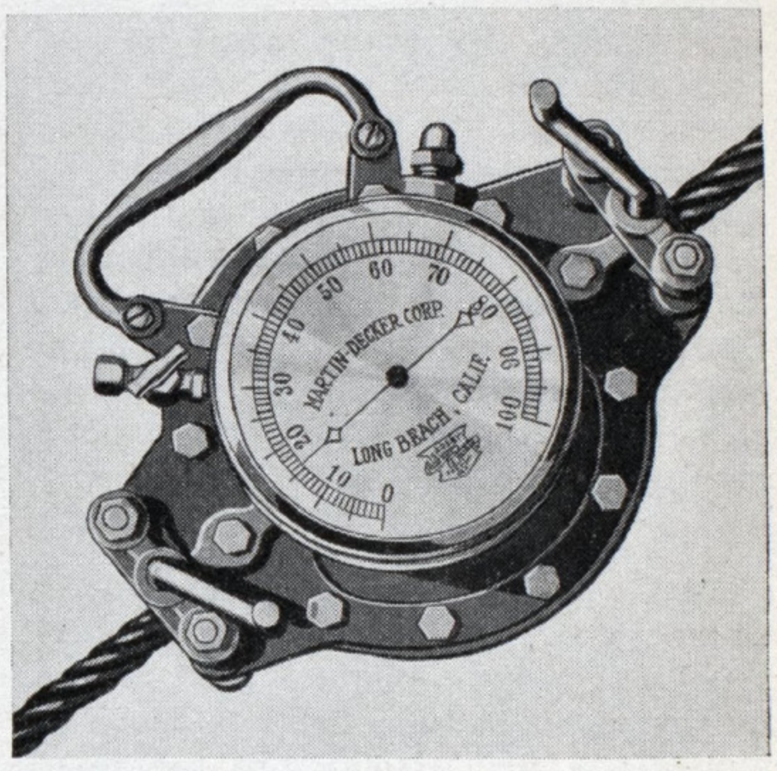
These slotted floor plates can be furnished in almost any gage and size up to 72 x 240 inches and in addition to being non-skid, they allow free ventilation, free drainage, passage of light and reduced weight.

Tension Indicator Gives Quick Load Reading

A SIMPLE, light tension instrument for measuring the line loads on yard cranes, hoists and standing rigging has been developed by the Martin-Decker Corp., Long Beach, Calif. The instrument may be applied to the line and the load read and removed in less than a minute. Provision is made for temperature adjustments when close accuracy is required.

In operation the tension indicator is clamped directly on to the cable span, measuring the load by the deflection principle without dead-ending or taking up slack. A definite off-set is made in the line between two fixed points and the force required to make or maintain this off-set is shown on the gage, a direct indication of the line load. It may be applied to the cable while already under load, prior to the application of the stresses, or during changes of the load, and will accurately register the tension at all times. Using a calibrated line, any pulling load may be measured.

In construction the tension indicator comprises two adjustable clamps, one at each end, which brings the line to a fixed stop. Between these clamps a pressure plate



Martin-Decker Tension Indicator

is fitted with a projection which attains the line off-set. This pressure plate bears against a flexible, canvas re-inforced rubber diaphragm backed up by a body of fluid. The fluid pressure generated is a positive measure of the force required to maintain the off-set in the line, and is indicated on the gage. It can be directly transposed into actual pounds tension on the cable.

Produce New Finish

RECENTLY there has been produced by the E. I. du Pont de Nemours & Co., Philadelphia, a radically new type of finish which possesses remarkable durability and flexibility. This product, called Dulux, has been developed through years of experimentation and trial by the company. Its marked departure from the finishes hitherto used lies in the fact that it contains a synthetic vehicle which replaces the linseed oil commonly used in high grade paints.

Interest in Dulux in the marine field is evident from reports received on the performance of the product as a finish for the hulls of ships, for painting the exteriors of superstructures and for all interior finishing including the holds of ships.

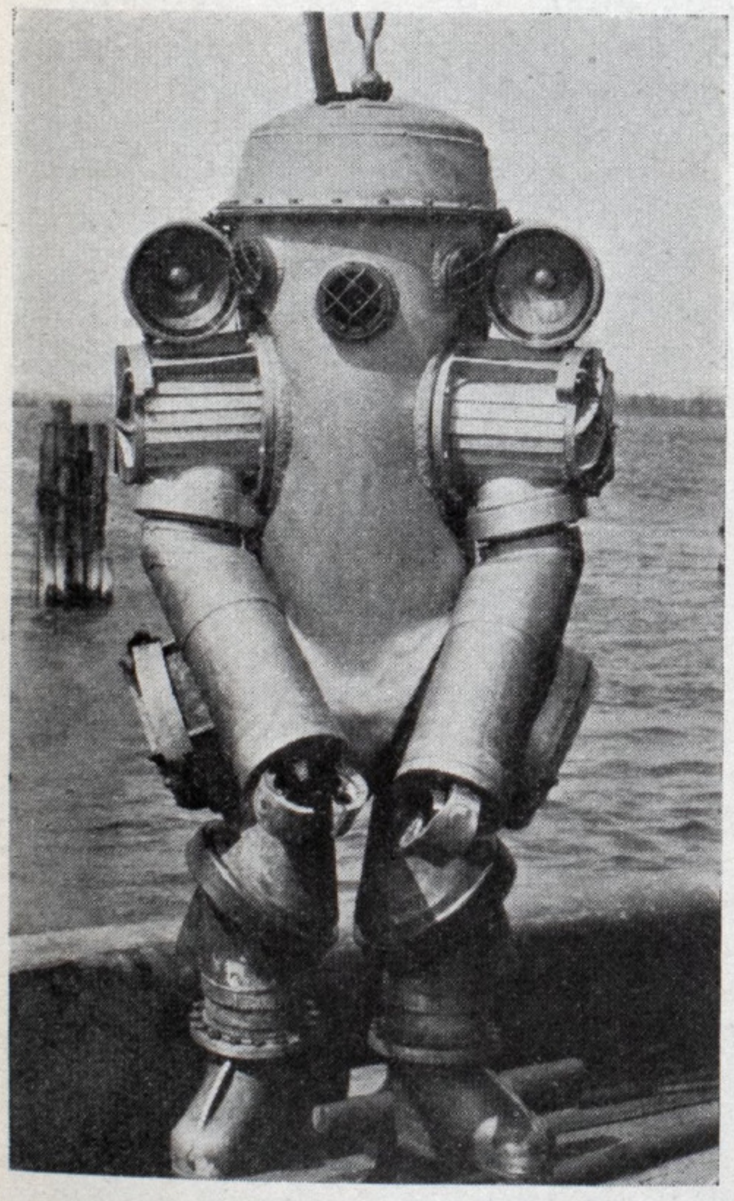
Incandescent Lamps Light Bottom of the Ocean

AFTER 15 years experimenting to perfect his present diving suit and its newer "mother ship," a huge diving bell, H. L. Bowdoin, New York, has found that to make successful visits to the ocean floor he must rely on artificial light.

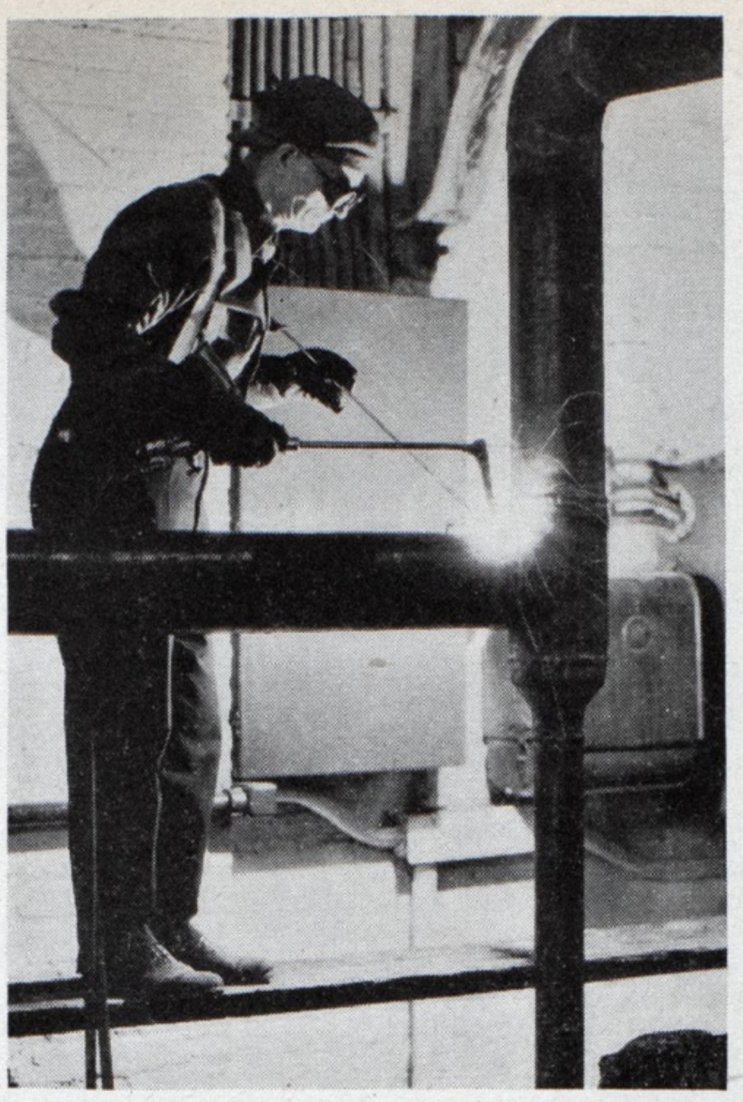
The complete salvaging apparatus consists of a perfected metal diving suit, a sea-going tug, and a heavy cylindrical diving bell, five feet in diameter and eight feet high. The bell is constructed of armor plate one inch thick and weighs 8000 pounds out of water, the buoyancy of the water reducing its weight to 1000 pounds as it is lowered.

Two 1000 watt Mazda lamps in special headlight reflectors rest on the shoulders of the diving suit and the diving bell has several 1000 watt Mazda lamps in small reflectors attached to its underside, making it is possible to see as far as 35 feet in clear water. An extensible lamp precedes the bell in dangerous locations. To prevent a "short" in one of the lamps, each is wired separately, if one burns out, the others will continue to give light.

To test these lamps the Westinghouse Lamp Co. placed them in a tank of water capable of producing variable hydraulic pressures and continuously burned there for one week. No pressure was applied during the night but during the day a pressure of 250 to 300 pounds per square inch was maintained. When, at the end of a week, the lamps were still burning, it was decided to increase the pressure gradually until they broke. At a pressure of 750 pounds per square inch the tank collapsed, but the lamps still burned on. Since a pressure of 750 pounds is equivalent to water pressure exerted at a depth of 1685 feet it was felt that the bulbs of these lamps would withstand working pressure for salvage work which scarcely ever would require a descent of more than 100 feet.



Heavy Diving Suit of H. L. Bowdoin. Automobile Reflectors with 1000-Watt Lamps Are Fitted on Each Shoulder



Welding Pipe With Seamless Steel Fittings

New Seamless Steel Pipe Fittings for Welding

AFTER several years of experimental and development work in the manufacture of fittings for pipe fabrication by welding, the Taylor Forge & Pipe Works, Chicago, recently put out a complete new line of seamless steel pipe fittings for welding consisting of elbows, tees, reducing tees, bull plugs and reducing nipples as well as forged steel butt welding flanges. All sizes to 24-inch are available. The tees are made in sizes 2 to 6-inch.

This line of fittings permits entire pipe systems fabricated by welding to be installed with only the use of true circumferential welds. Erection is considerably simplified, the fittings being lighter in weight than cast steel fittings and therefore requiring fewer and lighter supports. They require less space in erection and permit easy and economical insulation. The elbows are made without thinning or buckling of the walls and have short tangents to facilitate welding and accurate lining up. The ends are machine tool beveled.

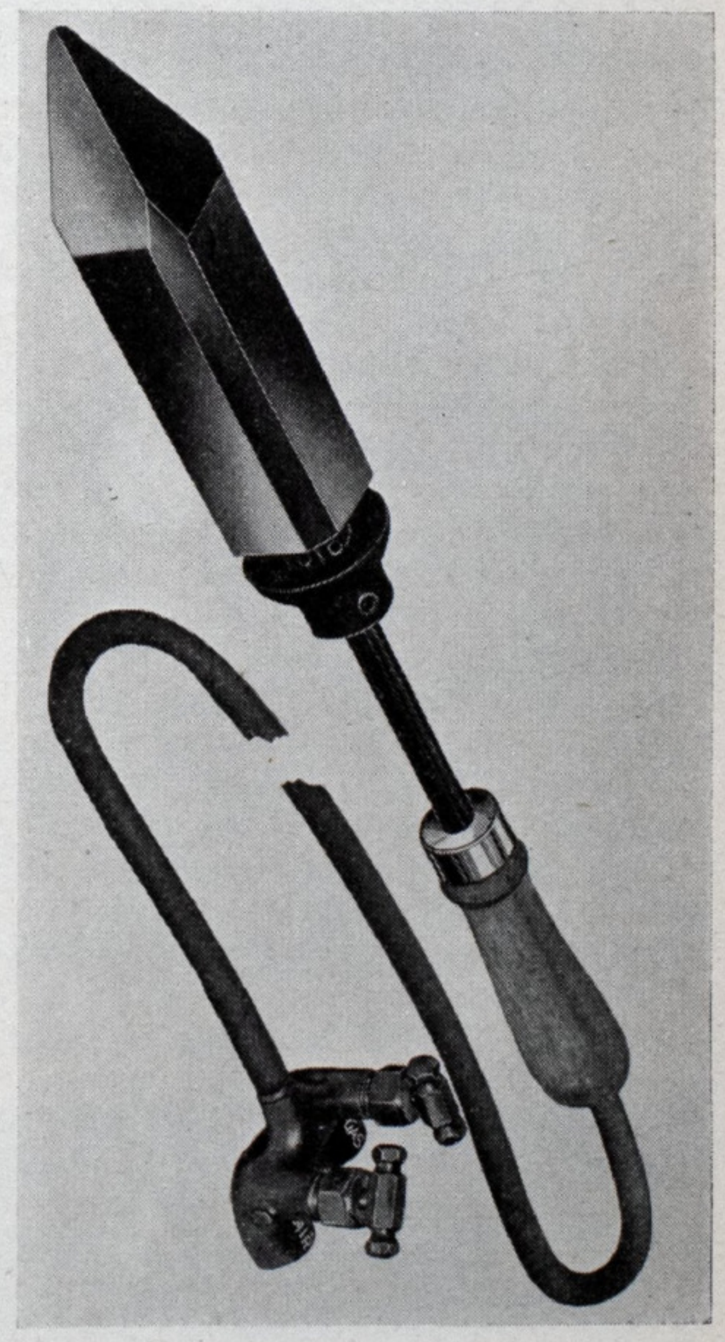
The forge tees are made to pipe thickness at the ends, with the body thickened up especially around the outlet to give required reinforcement.

Gas-Heated Soldering Iron Has Distinctive Features

INCREASED efficiency and greater economy are claimed for the new gas-heated soldering iron recently introduced by the Reliance Specialties Mfg. Co., 122 East Forty-second street, New York. Using the Torchiron, the operator has a continuously heated soldering iron for steady work. Low gas consumption is assured. With the three pound head, the fuel required is only four or five cubic feet of gas per hour, and with the five pound head, five or six cubic feet of gas per hour.

The iron is heated by either natural or artificial gas and low pressure air mixed by means of a needle valve, and passing through a flexible hose to the handle of the torch. Constant temperatures are increased or decreased by regulation of the needle valve. The copper heads may be brought to a red heat within three to five minutes after lighting. A great deal of the filing and cleaning, dipping and retinning of the coppers is eliminated, as the copper heads are not exposed to the open flame.

Coppers are available in sizes ranging from one-half to five pounds, and also are made to specifications. They are quickly interchangeable, being screwed on the stainless steel tip. As the name implies, the Torchiron may be used as a torch as well as an iron, merely by removing the copper head. This feature is especially handy for shipbuilding use.



Gas-heated Soldering Torchiron

Personal Sketches of Marine Men

A. V. S. Olcott, President Hudson River Day Line

By E. C. Kreutzberg

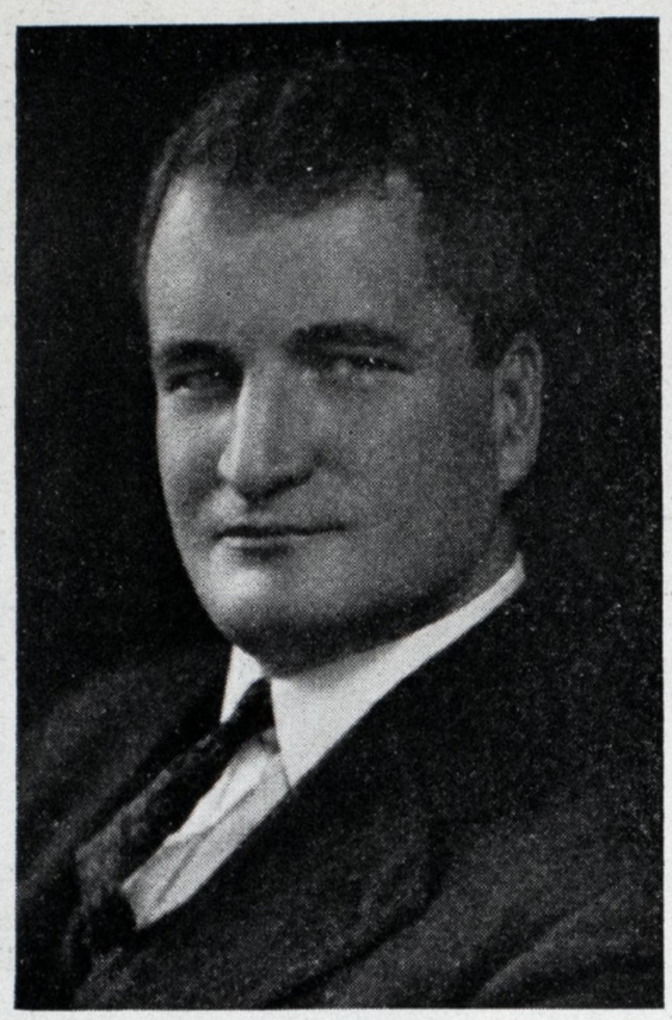


Photo by Blank & Stoller

THE record of the steamship company he heads corresponds with the story of the growth of navigation on the Hudson river

HE HAS the unusual distinction of representing the fourth generation in uninterrupted ownership and management of the same line

UNDER his leadership the Hudson River Day line is keeping pace with the best modern ideas in equipment and operation

FOR 105 years the boats of the Hudson River Day Line and its predecessors have been plying uninterruptedly on the Hudson river. During all of that time the ownership and management has been in the succeeding generations of the same family. Of this family, Alfred Van Santvoord Olcott, present head of the line, represents the fourth generation. His great grandfather, Abram Van Santvoord, born in 1784, succeeded a relative John Post, in the business of transport on the Mohawk river. In 1818 the forwarding business of Van Santvoord & Co. was dissolved and in 1826 Abram Van Santvoord set up in New York as "agent" for "The Steam Navigation Co.", operating the safety barges LADY CLINTON and LADY VAN RENSSELAER, with headquarters at 17 Coenties Slip, New York city. Thus was started the Hudson River Day Line.

In the history of the line is conveyed much of the colorful story of steam navigation on the Hudson river. Take the safety barges, for instance. They were towed by steamboats which plied between New York and Albany and where the fare on the steamboats was $1 for the trip, that on the safety barges was $2.

In the early years, boats provided the only means of steam travel in the Hudson valley, as it was not until 1851 that the first railroad between New York and Albany was completed. In the years of construction, the railroad and the boat managements worked together and the boats enabled rail passengers to complete their journeys beyond the end of the tracks. After the completion of the railroad bitter competition developed between the railroad and the steamboat lines. Rates on the river were cut from $1 to 50 cents a trip. Later there was a drop to 25 cents and another to 6 cents. For a time in 1860 a trip could be made by boat from New York to Albany without any charge at all.

Commodore Alfred Van Santvoord, born in 1819, was the son of Abram Van Santvoord and succeeded the latter in the ownership and operation of the Hudson River Steamboat Co. In 1863 he started the "Albany Day Line" for exclusively passenger transportation and this company was incorporated in 1879 by Commodore Alfred Van Santvoord and his son Charles Townsend Van Santvoord as the Hudson River Line. Later the name was changed to the present Hudson River Day Line. The daughter of Commodore Van Santvoord married Eben E. Olcott who later headed the line until his death in 1929 when he was succeeded by his son Alfred Van Santvoord Olcott.

Born in 1886 in New York city, Alfred Van Santvoord Olcott was educated at Princeton university, from which he graduated in 1909 as a bachelor of science. He at once went with the Hudson River Day Line, serving first as treasurer, then as treasurer and general manager, becoming president in 1929. When Mr. Olcott joined the line in 1909 it owned and operated four boats. Today the line owns and operates seven boats, HENDRICK HUDSON, ALEXANDER HAMILTON, ROBERT FULTON, DEWITT CLINTON, PETER STUYVESANT, ALBANY and CHAUNCEY M. DEPEW.

The principal operating problem of the Hudson River Day Line is to have its vessels so located as to accommodate the travel bulges over week-ends and during the vacation period and to take care of excursions. For instance, every summer week-end sees the New York-Poughkeepsie run served by four sections. On one Labor day, which marks not only a holiday week-end but the official ending of the summer vacation period, the line carried 12,000 northbound and 29,000 southbound passengers in that one day. Excursions are operated from New York city to Bear Mountain state park and other points along the river. In particular, excursions are operated to Indian Point, near Peekskill, where the Hudson River Day Line owns a large park and picnic ground.

Mr. Olcott is also president of the Hudson River Steamboat Co. and the Catskill Evening Line, the former operating two boats and the latter one. While the Hudson River Day Line carries passengers exclusively, these two lines carry principally freight.

The Hudson river boats operate over a short season. They generally get up steam about May 15 and tie up for the winter sometime between the middle of September and the middle of October. Mr. Olcott has his office at the Hudson River Day Line's general headquarters, Forty-second street pier, New York. His home is at Riverdale, on the Hudson, New York city.

Elevator Installations On Large Ocean Liners

By L. E. Browne

DEVELOPMENTS in elevator engineering, increasing vertical speeds close to 1000 feet a minute with comfort and safety, make the modern skyscraper possible. Hardly less important has been progress made in construction of passenger elevators aboard some of the largest ocean liners completed or under construction in shipyards in the United States and abroad.

Nine large ships recently completed or being built in American shipyards will have passenger elevators comparable with those in modern buildings. These steamships include the PRESIDENT COOLIDGE and PRESIDENT HOOVER, built for the Dollar line round-the-world service at the Newport News Shipbuilding & Dry Dock Co. plant, Newport News, Va.; three ships being built for the San Francisco-Honolulu run of the Oceanic Steamship Co., Quincy, Mass., plant of the Bethlehem Shipbuilding Corp., and four ships for the Panama Mail Steamship Co., under construction at the Kearny, N. J., yard of the Federal Shipbuilding & Dry Dock Co. The elevators were installed by the Otis Elevator Co.

The EMPRESS OF BRITAIN is equipped with elevators by the English branch of the Otis company. This branch also has a contract for 19 elevators for the super-liner being built for the Cunard line. The EUROPA and BREMEN of the North German Lloyd are equipped with American type elevators, designed by the German branch of Otis. They also supplied the Swedish American liner KUNGSHOLM, and the Dutch boat JOHAN VAN OLDENBARNEVELT. The CHICHIBU-MARU, a Japanese motor ship, has a complete elevator installation.

Design and construction of elevators for ships is much more difficult than for shore use. Ship elevators must not get "seasick." Provision must be made for safety and reliability despite rolling and pitching of the ship. Dampness, salt air and other factors must be taken into consideration.

Ship elevators must be provided special safeguards and apparatus must be designed to occupy a minimum of space, always at a premium. Controller switches must not close when a ship rolls or pitches. This is accomplished either by using a solenoid type switch with the armature moving vertically to make contact, or by using the clapper type switch on which springs are mounted with sufficient tension to prevent the switch from closing due to its own weight. Springs may be omitted from the clapper type switch if a balanced switch arm is used, thus preventing it from closing unless its magnet is energized. Otherwise there is a possibility of the elevator moving in either direction out of control of the operator.

Traveling cables, carrying the control wires to the elevator car, if allowed to hang free from the bottom of the car, might swing and the loop of the cable catch on obstructions in the hatch, resulting in broken electrical connections and shut-down. It is necessary to provide a protective duct or

Passenger Elevator on Steamer President Hoover

sheath of sheet metal, for the traveling cable, extending the full height of the elevator hatch. The cable is confined to this duct and cannot catch on obstructions in the hatch.

Oil reservoirs for motor bearings, worms and gears are designed so as to prevent leakage of oil, but to insure lubrication at all times.

The type of door mostly used has been of the single or two-speed sliding type which is subject to slamming when closed, at times exerts a strain on the lock. With these doors, a reliable make of door interlock is required and it is always necessary to provide door holding latches by means of which the doors may be latched in the open position. The most suitable type of entrance door is the center opening, with geared hangar, one panel of which serves as a counterbalance for the other. This eliminates all tendency to slam, providing ease of operation, regardless of the pitching or rolling movement of the vessel.

Elevators operate continually in a damp, salt atmosphere and all vital parts must be protected against rust or corrosion. The car safety and counterweight safety parts receive a rust resisting finish.

Iron or steel parts of controller switches, limit switches and gate contacts are given a rustproof finish also, and all structural iron parts, such as controller frame, car frame, rail fastenings, are painted with red lead. Electric wiring is of lead and armored cable construction in accordance with standard shipboard practice.

A safety device is mounted on the counterweight frame designed to operate immediately in case hoisting cables break. The safety device grips the guide rails and prevents further descent. In addition, elevators installed aboard ship should always be provided with the safeguards furnished with elevators operating under normal conditions in buildings, which are usually subject to code requirements of the local municipal or state authorities. These safeguards, although they add slightly to the cost of the elevators, are required by the various codes to protect life and property.

During the war the Otis Elevator Co. constructed elevators for mine-laying ships, which handled the highly explosive instruments of destruction with safety. The company also installed elevators used on the airplane carriers U. S. S. LEXINGTON and U. S. S. SARATOGA.

Ore and Coal Movements

According to a report Aug. 1 of the Lake Superior Iron Ore association the July movement of iron ore from the Lake Superior district this year was 42.28 per cent lower than for July 1930.

During July 1931 a total of 4,956,061 tons of ore were shipped from upper lake ports as compared with 8,586,649 tons for the same month last year. Seasonal movement of ore to Aug. 1 decreased 55.97 per cent. Last year up to Aug. 1, there were 24,324,222 tons moved as against only 10,709,320 tons during the same period this year. Figures for July show an increase of over a million tons more than for June. The movement of ore from Lake Erie docks to interior furnaces is on a par with the lake movement. For July 36,938 cars were sent forward while for the same month last year 70,905 cars were moved. Unless a sharp upturn in the ore movement occurs during the remainder of the season, the total movement for 1931 will not exceed 30,000,000 tons.

The movement of coal remains at fair levels. Shipments for the season to the end of July amounted to 13,182,736 tons as compared with 19,080,511 tons for the same period last year.

All-Welded Construction Used in Full Model Types

THE CHARLESTON DRY DOCK & MACHINE CO. has carried on extensive research work and experiment in the development of welding in the fabrication of ships. The first completely all-welded tanker, the CAROLINIAN, was launched at this yard last year. The method of welding employed grew out of ideas of Richard F. Smith of the Charleston Dry Dock & Machine Co. Mr. C. V. Boykin, vice president and general manager of the company, has spent a great deal of money and several years in developing the all-welded ship.

Generally, the all-welded type of construction has been applied only to flat work such as barges or flat tankers. Welded ships built by this company have all been of the full model type, with the rounded, smooth and fair lines associated with all-riveted construction. Consequently, as far as known, the Charleston company is the first to develop by all-welded construction a ship with the outside appearance of the usual model.

The all-welded method of construction is used in the main engine foundation, the auxiliary foundation, sea chest, fire main, rudder carriers and rudders, stanchions, hatches, doors, fenders, chocks, hand rails, scuppers and other auxiliaries. The use of extra heavy steel pipe as a stern tube developed by the company has been approved by the American Bureau of Shipping.

Considerable experimenting has been done by the company with plates welded together and immersed in salt water for long periods, some painted and some unpainted. Numerous pieces of plating and other structurals welded together at this yard have been tested by the Pittsburgh Testing Laboratory. These comprised horizontal, vertical and other forms of welding.

Recently, the office of the United States engineer at Wilmington selected a barge 80 feet long, 26 feet wide and 6 feet depth with a capacity of 70,000 gallons or deck load of 212 tons, built by the company by all-welded construction.

At the present time the company has under construction an all-welded tanker 65 feet long by 22 feet wide by 8 feet deep with a capacity of 40,000 gallons. This tanker will be propelled by a 75-90-horsepower diesel engine. All-welded construction permits building this type of tanker in capacity from 15,000 to 60,000 gallons with practically the same lines, it being only necessary to change the dimensions. A 50-foot yacht of all-welded construction is also under construction. The hull is all-welded with house of solid mahogany. Propelling equipment consists of a 60-horsepower Fairbanks-Morse diesel engine.

The ferry boat ISLAND GIRL, shown in the accompanying illustration, is the first ferry boat of all-welded construction to be built under the supervision of and to receive the approval of the American bureau of shipping. This vessel has just been completed at the yard of the Charleston Dry Dock & Machine Co. and delivered to her owners, the Seaboard Airline railway, Savannah, Ga. The vessel was built in 90 days.

The ISLAND GIRL is 64 feet 6 inches long, 22 feet wide and 6 feet deep at center, 10 feet deep at bow and 9 feet 6 inches deep at stern. Her load draft is 4 feet forward and 5 feet 9 inches aft. The hull is constructed of ¼-inch plating with 18-inch web frames spaced 8 feet apart and with 6-inch longitudinals spaced 24 inches. The vessel has five watertight bulkheads and a fuel cofferdam of 2000 gallons capacity. The hull has smooth lines and the extreme breadth of 22 feet gives a high metacentric height of 7 feet, which is a large margin of safety for the vessel's designed cargo of 175 passengers.

Power is supplied by a 125-148-horsepower Fairbanks-Morse diesel engine with clutch and reverse gear.

Trials were run over a mile course and her speed averaged 9.4 miles per hour with approximately 14 per cent slip of the propeller. Her contract called for a speed of 8 miles per hour.

Eastern Sword Sold

Sale of the steamer EASTERN SWORD to Capt. C. Poulacos on behalf of the Colonel Steamship Corp., New York, for $54,000 was approved by the shipping board on Aug. 11 with the understanding that the vessel be converted to a bulk cargo carrier at a cost of not less than $35,000. Payment for the vessel will be on the basis of $30,000 cash with the balance payable in three equal annual installments. The ship is to be used between North Atlantic and Gulf of Mexico ports of the United States. The EASTERN SWORD is a steel cargo steamer of 5532 deadweight tons and is laid up at Staten Island, N. Y., having been inactive since June, 1924.

Mail Route Certified

Certification of the type, size and speed of vessels required for the maintenance of a line for the transportation of railway freight cars between New Orleans and Havana was forwarded to the postmaster general by the shipping board on Aug. 11. Frequency of service during the first two years of the proposed ocean mail contract will be 50 a year, and thereafter 100 a year. At the outset, vessels of 6500 deadweight tons capable of 13-knot sea speed and having capacity for 90 freight cars will be acceptable, but at the close of the first two year period the contractor will be required to add two new vessels of the same size and capacity, but capable of 14-knot speed.

Sell Brooklawn Property

The shipping board on Aug. 19 authorized the formulation of specifications for bids and advertisements covering the sale of mortgages and housing properties owned by the board at Brooklawn, N. J. This property is part of a community developed during the war for the accommodation of workers at the shipyard in Camden. Some 200 of the houses already have been sold to individuals, but there remain mortgages on these which the board nuow offers for sale. In addition there are about 70 dwellings to be sold.

Advertisements will be ready for publication within the near future.

It was announced on Aug. 18 that the Worthington Pump & Machinery Corp. had acquired the manufacturing and marketing facilities of Metalweld Inc., Philadelphia.

Ferry boat Island Girl recently completed at Charleston Dry Dock and Machine Co. by all-welded construction for Seaboard Airline railway

Two Marine Railways Are Installed at Curtis Bay

THE United States coast guard depot at Curtis Bay, Md., has recently completed the installation of two marine railways. The larger of the two has a lifting capacity of 40 tons and is designed to haul out the 75-foot coast guard boats. The cradle of this railway is built of steel, 40 feet long and 20 feet wide. It runs on double flanged, chilled wheels turning on hardened steel axles, and it is fitted with three sets of adjustable bilge supports on each side. The track is constructed of creosoted timber on a foundation of creosoted piling. The rails are of standard railroad type. This railway is operated by a special open-link chain driven by a electrically operated, geared hoist.

The small railway has a lifting capacity of 15 tons and is designed to handle the large life boats which are built at this station. The cradle is 20 feet long and is built of steel running on wheels similar to those of the large railway. A turntable 22 feet in diameter is located at the upper end of the track and the cradle travels directly over it from the track. The cradle and boat can thus be turned to meet tracks in the yard leading into the building where the life boats are constructed. Its purpose is not only to haul out such boats for repair, but to launch new boats as built. The turntable is built of steel and the circular pit of reinforced concrete.

Both of these marine railways were designed and constructed by The Crandall Engineering Co., Cambridge, Mass., and are the one hundred and sixty-fourth and one hundred and sixty-fifth railways built by that company.

R. R. Davis who has directed in the past 21 years various Westinghouse advertising activities, has been appointed apparatus advertising manager of the Westinghouse Electric & Mfg. Co. at East Pittsburgh. He will have charge of all apparatus advertising activities of the company except the merchandising department, headquarters for which are located at Mansfield. O.

The directors of the Todd Shipyards Corp. at their August monthly meeting declared the regular quarterly dividend of $1 per share, payable on Sept. 21 to stockholders of record at close of business Sept. 5.

July Lake Levels

The United States Lake survey reported the monthly mean stages of the Great Lakes for the month of July as follows:

Lakes	Feet above mean sea level
Superior	602.26
Michigan-Huron	579.14
St. Clair	574.40
Erie	571.70
Ontario	245.27

Lake Superior was 0.28 foot higher than in June and was 0.63 foot lower than the July stage of a year ago.

Lakes Michigan-Huron were 0.04 foot lower than in June and 2.14 feet lower than the July stage of a year ago.

Lake Erie was 0.11 foot higher than in June and 1.82 feet lower than the July stage of a year ago.

Lake Ontario was 0.16 foot lower than in June and 2.82 feet lower than the July stage of a year ago.

The American Locomotive Co., 30 Church Co., New York, has recently undertaken the manufacture and sale for the American market of marine specialties devised and perfected by J. Stone & Co., Ltd., Deptford England. An organization to especially present Stone products to American shipowners direct has been established by the Locomotive company.

Atlantic Passenger Trade

(*Continued from Page* 23)

steamship approaching in extravagance of design the greatest New York liners. Particularly in regard to the matter of speed is this a significant development.

A considerable portion of transatlantic patronage originates in such parts of the United States and Canada for which Quebec and Montreal would ordinarily figure as seaports of convenience at least equal to New York. Yet, by reason of superior express liner service New York has been able to attract from those parts much traffic that might otherwise have gone through the St. Lawrence.

But with the EMPRESS OF BRITAIN now in service there would hardly seem to be any reason for New York's being thus favored from such points of origin, that is, at those dates when her schedule renders the new Canadian flier available.

Furthermore, the EMPRESS OF BRITAIN might seem in a position to attract certain patronage from New York city itself. For it must not be forgotten that to some ocean voyagers the bane of seasickness outweighs all other considerations; such travelers naturally desire to shorten their time at sea to a minimum. The New York liners, in crossing between America and Europe, cover the entire distance by sea; the EMPRESS OF BRITAIN, from Quebec, for a good part of her route traverses quiet waterways—the River and Gulf of St. Lawrence—so that she traverses the high sea for only about three quarters of her passage.

Advantages of Shorter Sea Run

Granted, then that the EMPRESS OF BRITAIN does yield somewhat in speed to the BREMEN, EUROPA, MAURETANIA, and perhaps LEVIATHAN and MAJESTIC, the fact remains that in the course of a passage the EMPRESS steams on the open sea for but 3½ days of the trip or less, as against 4½ to 5 days for the New York record holders. For those that dread the ocean this is a consideration of no little influence.

Of course, New York still enjoys the advantage of much greater frequency of express sailings; compared with this one express liner fom Canada, there ply no less than thirteen out of New York to English channel ports. But should the Canadian Pacific company proceed with the construction of a running mate or two for the EMPRESS OF BRITAIN, as it presumably will some time in the future, New York will at last be confronted, in the St. Lawrence gateway, with a formidable competitor for the express passenger traffic.

The steamer CITY OF BALTIMORE, flagship of the Baltimore Mail line, came into her home port July 30, completing her first round trip to Europe.

American Foreign Trade Gains in Six Years

The shipping board through its bureau of research has conducted several surveys on the subject of direct and indirect trade between the United States and other nations The surveys covered the calendar year 1924. and the latest one now available is for the year 1929 making possible a study of this subject for a six-year period.

The term "direct trade" is a designation applied to commerce between any two nations that is conducted in vessels of either of those nations. Commerce of such nations when conducted in vessels of other nations is termed "indirect trade."

The total water borne foreign trade of the United States for the year 1924, amounted to 93,216,000 cargo tons and in 1929 to 108,601,274 tons. Of these totals 66,072,000 tons in 1924 and 75,411,000 tons in 1929, were transported in direct trade, these figures representing 71 and 69½ per cent respectively of the total trade for the two years.

As regards imports and exports during the two annual periods mentioned, about 70 per cent of the imports for 1924 and 71½ per cent of the exports for that year moved in direct trade, while in 1929 nearly 68 per cent of the imports and about 71 per cent of the exports were carried by vessels of the countries directly interested.

During the year 1929 American flag vessels carried nearly 40 per cent of our total water borne foreign commerce and over 57 per cent of the commerce which moved in direct trade. During that year commerce was conducted with 50 foreign countries, the direct trade extending to all but 4, Arabia, Latvia. Lithuania and Persia, whose trade was conducted wholly in vessels of disinterested nations. American flag vessels participated in the commerce of all of the 46 countries with which direct trade was conducted, and carried all of the direct trade with 20 of these countries.

Cargo Traffic Record

The department of commerce reports that cargo traffic through St. Lawrence canals in May created a new high record for that month, and that through the Welland Canal was the heaviest handled in any May for the past ten years.

In establishing the May record for the St. Lawrence canals, cargo amounting to 1,166,000 tons passed through the locks, as compared with 841,000 tons in the same months last year and 1,094,000 tons in May, 1927, the previous peak for the month in question.

Electric Storage Batteries Supply Operating Current

The cruiser VELERO III, designed by G. Bruce Newby and built by the Craig Shipbuilding Co. of Long Beach, Calif., for Capt. G. Allen Hancock is equipped with two Exide batteries of 56 cells each. These batteries have 450 ampere hour capacity at the 8-hour rate. An additional battery of 32 cells is used to operate the Sperry Gyroscopic compass. The system of charging used is the Exide marine floating battery system. The two batteries in multiple supply current to operate auxiliary and fire pumps, windlasses, capstans, refrigerating units, fans, generators, radio, searchlight, range, hot water heaters, galley equipment, motion picture machine etc.

Three Contracts Awarded for Ocean Mail Routes

Announcement was made at the post office department Aug. 20 of the awards of contracts on three additional ocean mail routes, bids for which were opened Aug. 17.

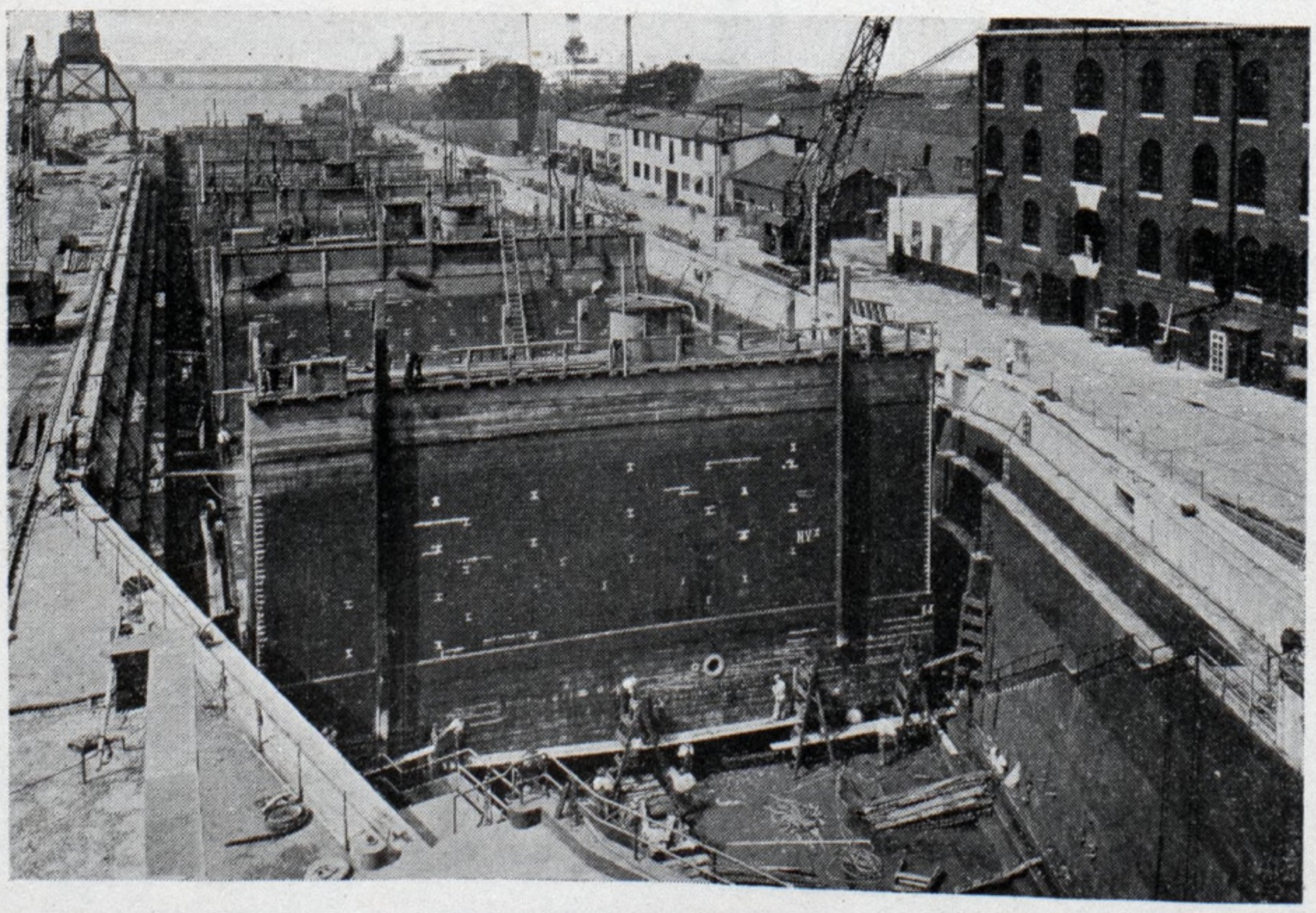
The American Diamond lines Inc. of New York City is awarded the contract on the route between New York and other North Atlantic ports to Rotterdam and Antwerp. The firm agrees to furnish vessels of Class 6 at $2.50 per nautical mile; vessels of Class 5 at $4 per mile, and vessels of Class 4 at $6 per mile. If additional vessels are required the concern is to furnish vessels of Class 3 at $8 per mile; vessels of Class 2 at $10 per mile, and vessels of Class 1 at $12 per mile.

The Waterman Steamship Corp. of Mobile, Ala., is to operate the route from Mobile or other East Gulf ports to the United Kingdom and other northern European ports. It is to furnish vessels of Class 6 at $2.50 per mile; Class 5—$4; Class 4—$6. If additional vessels are required the company is to furnish vessels of Class 6 at $2.50 per mile; Class 5—$4 per mile; Class 4—$6 per mile, and Class 3—$8 per mile.

The Gulf Pacific Mail line Ltd. of San Francisco, is to operate the route from Seattle to Tampico, Mex. It agrees to furnish vessels of Class 6 at $2 per nautical mile and vessels of Cless 5 at $3.50 per mile. If additional vessels are required the concern is to furnish vessels of Class 6 at $2 per mile; Class 5—$3.50 per mile; Class 4—$5.50; Class 3—$7.50; Class 2—$9.50, and Class 1—$11.50 per mile.

The contracts for these three routes run for a period of 10 years beginning Oct. 1, 1931.

Dry Docking A Dry Dock at Todd Yard in Brooklyn



AFTER 31 years of continuously efficient service, the Tietjen & Lang Dry Dock Company's large floating dock was dry docked for overhauling in the monster new graving dock of the Todd Shipyards Corp. in Brooklyn.

Upon inspecting the floating dock, it was found that the timbers were in as good a state of preservation as the day she was built. The dock was caulked, resheathed, and put in service three days following her first day in dry dock.

Lubricating Steam Cylinders

(*Continued from Page* 33)

of the excess oil passes to the boilers.

By correctly applying the proper grade of cylinder oil for specific operating conditions, efficient lubrication of all working parts is at all times assured without risk of boiler damage. In fact the oil feed is minutely controlled to suit the individual job, so that there is no chance of the oil reaching the boilers, and maximum operating economy is thus obtained.

By injecting the special cylinder oil into the main steam pipe about six feet from the throttle valve through an atomizer (Fig. 6) the velocity of the steam breaks up the oil and the steam is impregnated with just enough oil to provide efficient lubrication for valves, cylinders and piston rings.

A mechanical lubricator worked by the engine indicator gear or valve gear injects the oil into the steam line through the atomizer. This lubricator can be adjusted minutely for consistent drop by drop oil feed. Referring to A, Fig. 5, it can easily be seen that far more oil will be required for any engine without the atomizer B, Fig. 5.

On a large transatlantic triple screw vessel with 21,000 horsepower, equipped with twin 4-cylinder triple expansion engines of 7000 horsepower each exhausting into a low pressure turbine of 7000 horsepower, driving the center propeller, much trouble was experienced with excessive wear of high-pressure piston rings (Ramsbottom type, Fig. 2). This trouble was so severe that it was necessary to renew the rings after each Atlantic crossing. The superintendent engineer and chief engineer in analyzing the situation came to the conclusion that the trouble was due to dirty steam. Separators were installed in each boiler, but still the rings had to be renewed each trip at New York and Antwerp.

Different type rings made of different material, including one set made of monel metal, were tried but did not alleviate the excessive wear. The monel metal rings scored the liner, necessitating reboring. At this juncture the ring trouble was considered a necessary evil, which was not only expensive in piston ring renewals and high fuel consumption, but extremely hard on the engineering staff who shouldered the work of removing cylinder covers and renewing rings in addition to overhauling piston rod metallic packing each trip, as the packing could not be kept tight with the pulverized ring material working on the piston rods.

A study of the conditions on this ship was finally made having correct lubrication in mind, and it was found that operating conditions warranted special consideration. The boiler working pressure is 210 pounds per square inch without superheat. Separators were installed in each boiler. Separators were already installed in both main steam lines between main steam stop valves and throttle valves. While the separators in the boilers did not minimize the trouble, it was safe to assume that no abrasive material was being taken over into the engine with the steam to cause the abnormal ring wear.

It was obvious that piston rings were making metallic contact with the cylinder walls which quickly ruined them. The separators in the main steam lines were so efficient that the steam entering the high pressure valves and cylinders was very dry or approaching a superheated condition which permitted mechanical friction of the rings on the cylinder walls to destroy the rings. The real problem was to introduce and maintain a suitable film of lubricant on the cylinder walls, and internal lubrication in the manner described above was suggested.

The chief engineer was skeptical about introducing cylinder oil into the valves and cylinders, as he felt that while the ring trouble might be overcome the cylinder oil would go over with the reciprocating engines' exhaust steam into the low pressure turbine, adhering to the turbine blading and greatly reducing the turbine efficiency, in addition to the posibility of some cylinder oil reaching the boilers. So the chief engineer was advised to inject a special cylinder oil into the main steam lines. These suggestions were carried out and in a period of nearly two years' operation there has been but one piston ring renewal and no cylinder oil has accumulated in the low pressure turbine let alone reaching the boilers.

This vessel makes a world cruise annually and her experience emphasizes the absolute necessity of cylinder lubrication. While enroute from New York to San Francisco, on a world cruise the mechanical lubricator on the starboard engine became disabled for a few days and on arrival at San Francisco the high pressure piston rings in this engine had to be renewed.

On the first world cruise after efficient cylinder lubrication was provided the vessel steamed six hundred miles more than on the previous cruise with reduced fuel consumption of 350 tons and reduced repairs to the extent of six complete sets of high pressure piston rings in each engine. Cylinder oil consumption per day (24 hours) is less than one quart per engine which is less than with the method of swabbing rods and valve stems. Every engineer knows what greatly reduced operating efficiency would have been experienced on this vessel had piston rings been discarded and hoods or plug pistons installed to eliminate ring trouble.

The marine superintendent of one of the large steamship companies found persistent piston ring trouble on one of the line's twin screw vessels. An inspection was made and the internal system of cylinder oil application with special cylinder oil was recommended. In this connection it may be said that special oil is absolutely necessary for different installations and operating conditions to permit minimum feeds. He immediately was alarmed about getting oil into the boilers, but something had to be done and the recommendations were accepted. The piston ring trouble was completely overcome without any oil in the boilers and the fuel consumption on the cylinder lubricated ship has been found to be far less than on a sister ship with exactly similar main engines and auxiliary machinery. Obviously efficient internal cylinder lubrication is the only reason for lower fuel consumption on the economical ship and the inefficient vessel was immediately equipped in the same manner.

Transatlantic Lines Cut Passenger Fares

The new low transatlantic passenger rates which became effective on Aug. 17 enable the traveler to go from New York to Europe for $73 third class and $155 first class. The westbound rates become effective Oct. 1.

Under the new rulings the winter season begins Aug. 1 eastbound and Oct. 1 westbound. The "intermediate" period between the winter and summer seasons has been eliminated. The new rates do not affect the second-class fares but it is said these will be reduced by elimination of supplementary charges.

The following list shows the minimum first-class fares on thirty-six transatlantic liners between New York and Europe.

	Winter	Summer
Bremen	$260.00	$287.50
Europa	260.00	287.50
Isle de France	250.00	275.00
Empress of Britain	250.00	275.00
Aquitania	250.00	275.00
Berengaria	250.00	275.00
Majestic	250.00	275.00
Olympic	245.00	270.00
Leviathan	240.00	265.00
Mauretania	235.00	260.00
Paris	230.00	252.00
Columbus	225.00	247.50
Homeric	210.00	232.50
France	200.00	220.00
Saturnia	200.00	220.00
Vulcania	200.00	220.00
Statendam	200.00	220.00
Albert Ballin	195.00	215.00
Deutschland	195.00	215.00
Hamburg	195.00	215.00
New York	195.00	215.00
Belgenland	187.50	207.50
Empress of Austria	185.00	205.00
Reliance	185.00	205.00
Resolute	185.00	205.00
Rotterdam	180.00	200.00
Empress of France	177.50	197.50
Gripsholm	177.50	197.50
Kungsholm	177.50	197.50
Caledonia	165.00	182.50
Transylvania	165.00	182.50
Minnetonka	165.00	182.50
Minnewaska	165.00	182.50
Nieuw Amsterdam	155.00	172.50
Veendam	155.00	172.50
Volendam	155.00	172.50

J. G. Campazzie was recently appointed vice president, directing sales, of the Headley Emulsified Products Co., Franklin Trust building, Philadelphia.

New Trade Publications

ELECTROLYSIS ELIMINATOR—A folder has been issued by the Marine Electrolytic Eliminator Co., Seattle, describing its new device which ends for all reasonable time electrolysis of stern bearings, propellers, propeller shafts, rudders and shoes.

CIRCULAR BURNERS—Fuller Lehigh Co., 85 Liberty street, New York, recently issued bulletin No. 905 covering its circular burner for pulverized coal. The application, advantages, construction and operation of the burner are set forth and the folder is illustrated.

TURBINE ELECTRIC SHIP PROPULSION—Westinghouse Electric & Mfg. Co., East Pittsburgh, has issued a new publication, S. P. 1814, covering turbine electric ship propulsion. Installations in passenger liners, battleships, coast guard cutters and ferries are described.

TRUCKS AND TRACTORS — The problems of inter-departmental transportation are dealt with in a new bulletin issued by the Electric Storage Battery Co., Philadelphia, makers of Exide batteries. Many illustrations are included, showing the variety of equipment available for this purpose.

TURBO-BLOWERS AND COMPRESSORS—Bulletin No. 3132 describing and illustrating its line of turbo-blowers and turbo-compressors has been issued by the Ingersoll-Rand Co., 11 Broadway, New York. The construction and operation of single-stage and multi-stage units are covered.

BUYERS' GUIDE—The New Orleans Association of Commerce, New Orleans, has issued its Red Book and Buyers' Guide for 1931. The book is a classified directory of the port's business, listed in convenient form and also includes local importers and exporters, as well as an up-to-date roster of the membership of the association.

GAGE PROTECTORS—Champion & Barber, 576 Subway Terminal building, Los Angeles, has issued a folder describing its Champion and Non-pulsator gage protectors. Complete protection of all makes of gages under every operating condition is claimed for these products. The folder is illustrated and copies may be had upon request.

MARINE SIGNALING DEVICE—The International Flare Signal Co., Tippecanoe City, O., has issued a new booklet covering its aerial marine flares. These signal lights, which have been adopted by the United States coast guard, are described in detail. The various parts of the device are illustrated.

COOLERS AND HUMIDIFIERS—Air conditioning units of the suspended type are covered in bulletin No. 384 issued by the B. F. Sturtevant Co., Hyde Park, Boston. The mechanical features of these units are described and illustrated and other general data are given. The leaflet is also illustrated.

INSULATING FIRE BRICK—Bulletin No. 80 issued by the Babcock & Wilcox Co., 85 Liberty street, New York, discusses a new firebrick with insulating properties, a new building material for furnace work. Insulating properties and refractory characteristics are stressed, these being illustrated by curves, sketches and calculations.

SILENCING DEVICE—A new bulletin issued by L. Mundet Son Inc, 461 Eighth avenue, New York, tells how machinery should be isolated by means of natural cork to eliminate noise and vibrations. It explains why natural cork mats are preferable, gives a table of sizes and shapes of Mundet mats and shows curves of compression tests. The folder is illustrated.

DISTRIBUTION PROBLEMS—Under the title of "Making the Dealer an Advisor" the policyholders service bureau of the Metropolitan Insurance Co., New York, has issued a booklet describin a number of dealer advisory councils including form of organization, activities undertaken and the results accomplished. The data presented was gathered to improve relations between manufacturers and dealers.

PUMPS—Pumps for handling liquids carrying solids in suspension are described in a catalog on clogless pumps issued by the De Laval Steam Turbine Co., Trenton, N. J. These pumps are characterized by horizontally split casings, and are built with either enclosed or open impeller. Illustrations include finished pumps, parts, cross sectional views and line drawings. Speed and capacity tables also are given.

Business News for the Marine Trade

H. G. Wenzel, passenger traffic manager of the Clyde-Mallory Lines, has announced that the company's new liner SHAWNEE would be placed in the New York-to-Jacksonville run immediately to supplement other ships now in the service. The SHAWNEE, a fast liner capable of maintaining a 43-hour schedule between the two ports, will sail from each city once a week, from New York on Saturdays and from Jacksonville on Wednesdays.

A regular passenger and freight steamship service has been established by the Tampico Stevedores' union between Galveston, Texas, and Tampico, Vera Cruz and Progresso, Mexico. Two speedy combination passenger and freight ships, with a capacity of 90 passengers and 2400 tons of cargo, each, are in the service. It is planned to extend the service to the ports of Puerto Mexico, Frontera, Ciudad del Carmen and Campeche City on the Gulf of Mexico.

Stanley and John Thompson, Ltd., of London, managers and secretaries of the America-Levant Line, Ltd., announce that they have acquired the Cunard Steamship Co.'s entire holdings of ordinary and preference shares in America-Levant Line, Ltd., and that the representatives of the Cunard company have retired from the board. The business of the line will be continued as heretofore.

The bureau of supplies and accounts, navy department, Washington, will receive bids March 3, for delivery to various ports of call, for 12 generators and accessories, on schedule 5087.

Express freight and passenger service between Baltimore, the Virginia ports and Havre and Hamburg was begun with the departure of the steamship CITY OF BALTIMORE, from Baltimore July 2, the International Mercantile Marine Co. announces. The other four ships of the line, the CITY OF NORFOLK, CITY OF NEWPORT NEWS, CITY OF HAVRE and CITY OF HAMBURG all will be in service before the end of this year.

Recent Delaware charters include that of the Donaldson Towing & Lightering Co., Baltimore, Md., with 2000 to 7000 shares, no par value.

Marine Service Inc., Genesee Co., Long Lake, Mich., was recently incorporated with $15,000 capital by Elgin Clark, 2325 Forest Hill, to buy, sell, repair and store marine equipment.

Construction of a 2,000,000-bushel steel and concrete grain elevator on the east side of Oswego harbor will be started early in January under final plans of the Oswego Harbor Co., sponsor of the project. Plans tentatively provide for tripling capacity of the elevator and the erection of a large flour manufacturing plant after the first 2,000,000-bushel unit has been completed and placed in operation.

The Rapid Marine Transit was recently incorporated by C. Kimmich, 49th street and Lexington avenue, New York, with $100,000 preferred and 1000 shares of common.

The J. A. von Dohlen Steamship Co., Charleston, S. C., have been appointed agents for the Nelson Steamship Co. at that port. The Nelson line maintains a sailing every ten days east and westbound in the New York-Charleston-Pacific coast trade.

Pending establishment of its permanent offices, all communications should be addressed to the company in care of its counsel, Pendleton, Anderson, Crowley & Beatty, 25 Broad street, New York.

Announcement was made on Aug.. 4 that a new company known as the Canadian Australasian Line Ltd., had been formed to take over the Pacific liners NIAGARA and AORANGI of the Canadian Australasian Royal Mail line, operating between Vancouver, Australia and New Zealand. The new line will be jointly owned and operated by the Canadian Pacific and Union Steamship Co., New Zealand. J. C. Irons has been appointed general manager with offices in Vancouver.

The Fusion Welding Corp., Chicago, has appointed the Puritan Compressed Gas Corp., 2012 Grand avenue, Kansas City, Mo., as distributors for its Weldite line of welding rods. The territory served by the Puritan company will include the state of Kansas and the western portion of Missouri.

The Waterman Steamship Corp., Mobile, Ala., operating 14 steamships of the Mobile-Oceanic line as agent for the United States shipping board, recently increased its capital stock from $100,000 to $1,000.000. J. B. Waterman is president of the company.

The J. H. Curtis Boat & Engine Corp., Norfolk, Va., was recently chartered with a capital of $50,000.

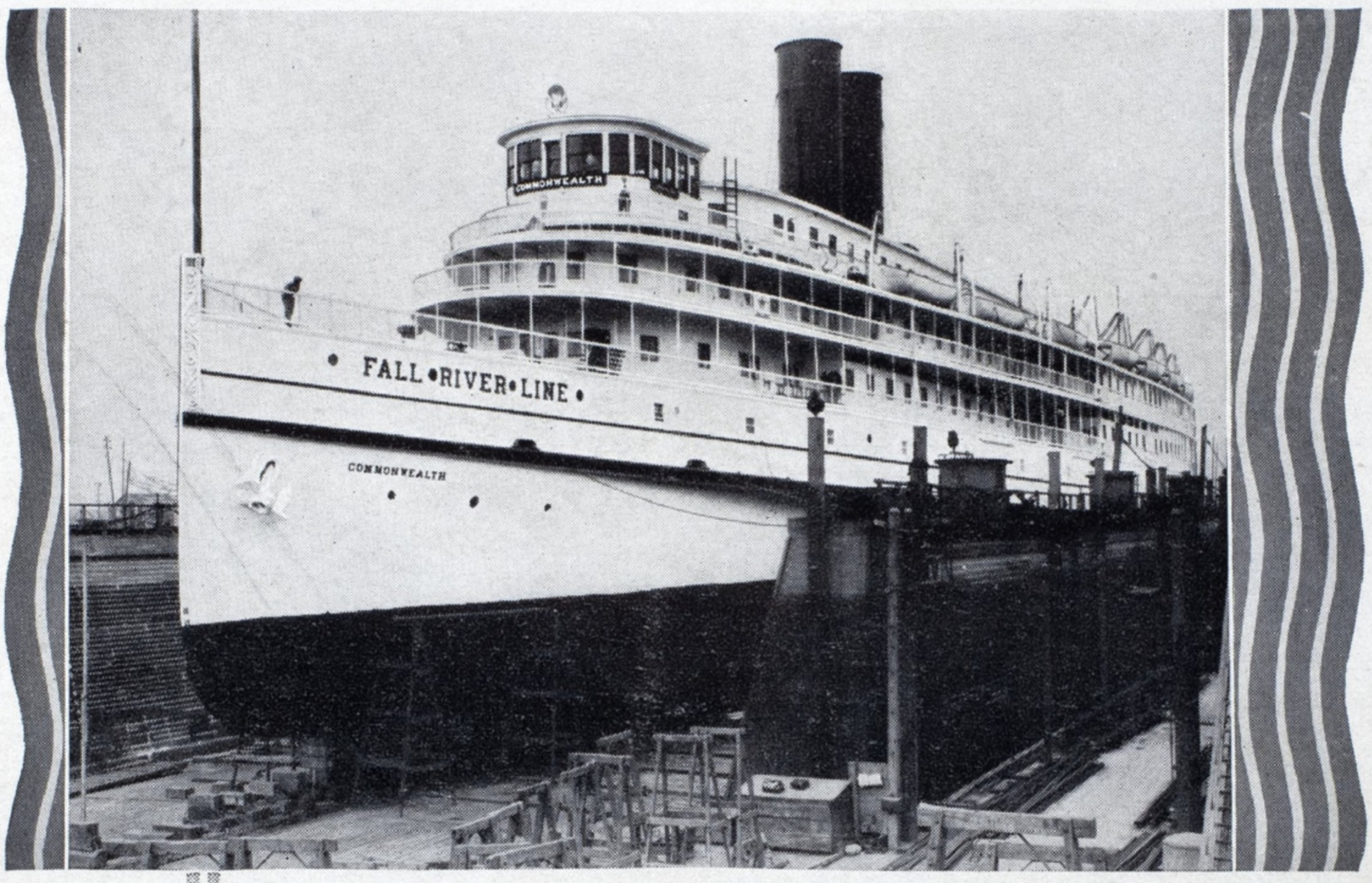
The Yorktown Maritime Corp., Yorktown, Va., was recently chartered to engage in the shipping, towing and chandlery business. J. W. Hornsby is president.

Marine Review

Reg. U.S Pat. Off.

The National Publication Covering the Business of Transportation by Water

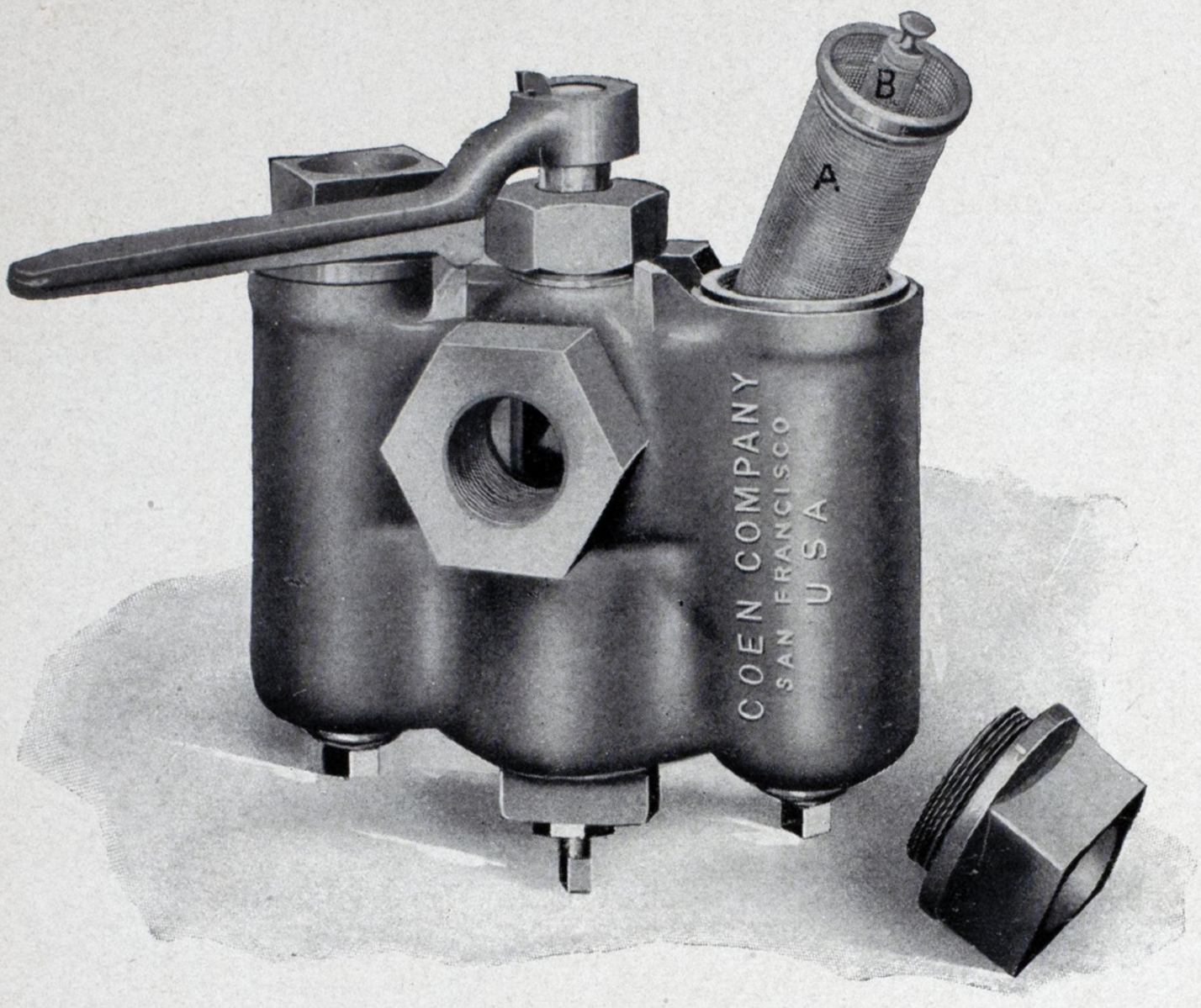
September, 1931



The S. S. "Commonwealth", largest vessel and flagship of the Fall River Line Fleet, on dry dock at the Tietjen & Lang Plant of Todd Shipyards Corporation, Hoboken, N. J., undergoing cleaning and a general overhauling.

you Pay for Protection

why not get the best?



Duplex Strainers in Cast Iron or Bronze

Designed for efficient and positive operation, compact installation and fabricated of best materials by expert workmen, Coen Duplex Strainers are serving various industries throughout the world. Built without valves, a 90 degree handle turn changes the flow from one to the other basket. The double basket affords a combined area of perforations from six to ten times the cross sectional area of the pipe. The strainer is so designed that when the well cover is removed, level of oil in well is lowered, exposing the top of the basket for removal. Built in two parts, the basket is readily cleanable. It is impossible to stop the fluid flow, regardless of the position of the handle. Unlike a strainer made up of valves and fittings, the Coen Duplex eliminates unnecessary joints.

Coen products include:

Mechanical oil burners.
Oil heaters, film type, all-steel, cleanable.
Fuel oil pumping sets and oil burning accessories.

COEN COMPANY INC.
COMBUSTION ENGINEERS

Manufacturers of Fuel Burning Systems

610 SOUTH BROADWAY, LOS ANGELES, CALIF.

112 Market Street, SAN FRANCISCO
Post Dispatch Building, HOUSTON
50 Church Street, NEW YORK

Vol. 61, No. 9, Sept., 1931, issue of MARINE REVIEW, published monthly at Cleveland, O. Entered as second class matter at the post office, Cleveland, Ohio, under the act of March 3, 1879. Subscription price $3.00 a year in U. S.; Canada, $4.00; Great Britain, £1; single copies, 35c

A New Development in Export Shipping

EDUCATION, service, claim prevention. To these ideals the Export Fibreboard Case Association dedicates itself.

Banded together for the common protection of export shipping, this Association is a federation of leading manufacturers of export fibreboard cases. One of their number, acting alone during the past two years, has had notable success. This Member's fibreboard cases, carrying principally canned goods and raisins, have been of a special export quality fibreboard. They have delivered their contents so satisfactorily to conservative European markets that a Standard of Merit for export fibreboard shipping cases has been set up.

The experiences of this Member are now made available to the entire Association. The Standard of Merit for fibreboard cases proven by actual export operations have been adopted by each of the Members. Fibreboard cases meeting this standard will be affixed with the official seal of the Association, reproduced in this announcement.

Many important shippers are taking advantage of Export Fibreboard Case Association service on their export shipments. With the help of a bulletin, just issued: "Suggestions for the Proper Handling of Export Fibreboard Shipping Cases," these shippers are aiding educating freight handlers in correct methods. For copies of this valuable bulletin address the

EXPORT FIBREBOARD CASE ASSOCIATION

Head Office: 155 Montgomery St., San Francisco, Calif.

New York Traffic Office: 15 Moore Street

An Association of leading manufacturers of export fibreboard cases

Hidden hazards

THERE'S nothing particularly menacing about an iceberg—above the surface. The trouble is you can't see the danger lurking in its submerged bulk.

Neither do incorrect lubricants log a record of daily wear—where you can *see* it. But the record is written day after day, month in and month out. Eventual overhaul usually tells the tale in terms of costly repairs and replacements.

There's no veering away from depreciation, but you can minimize it greatly with Gargoyle Marine Oils. These famous lubricants prevent needless wear and tear because each grade is *made to fit* a particular type of service.

The Vacuum Oil Company has specialized in scientific lubrication for 65 years. Vacuum representatives, thoroughly grounded in the knowledge that has come of this long experience, are stationed at more than 300 of the world's leading ports. When one of these men comes aboard at your next port of call, ask him about this question of increased engine-room economy.

In the meantime, we will be glad to send you either of these helpful books, without obligation: "*Steamships with Reciprocating Engines*," or "*Marine Lubrication—Motorships*." Address: Vacuum Oil Company, Marine Sales Dept. D-9, 61 Broadway, New York.

GARGOYLE

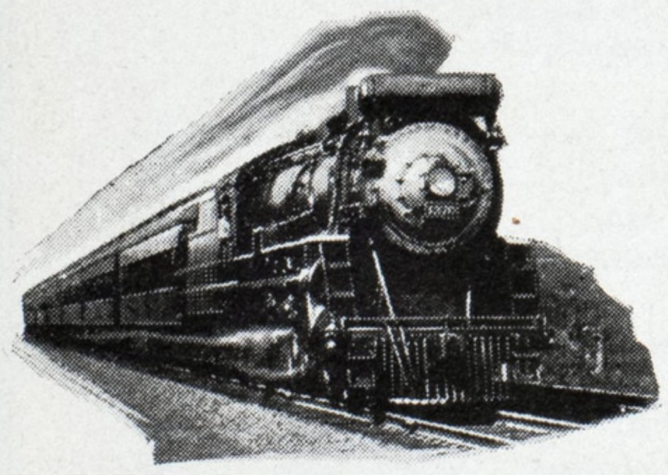
Marine Oils

A grade for each type of service

VACUUM OIL COMPANY

for strenuous

NEW YORK, NEW HAVEN & HARTFORD



Reducing the running time between New York and Boston to 4¾ hours, the YANKEE CLIPPER, *crack New York, New Haven & Hartford train, perpetuates the memory of the Yankee clipper ships, speed marvels of their time.*

uses this soft

DAY in, day out... lashed to heavy railroad barges... straining, pulling against the tide... plowing through harbor waters choked with mud, sand, grit ... Such strenuous towing service is hard on tugs... on their stern bearings.

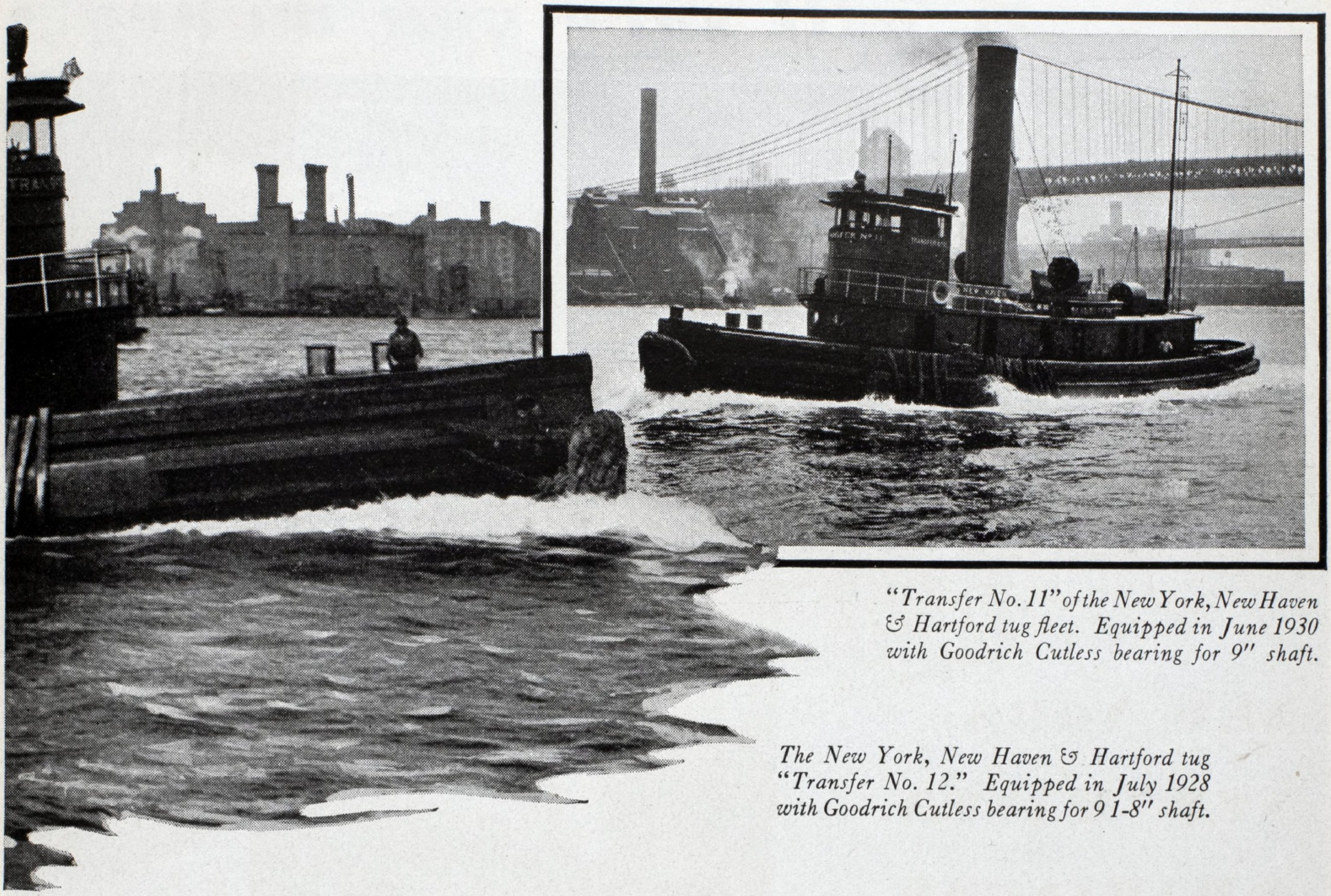
But "Transfer No. 11" and "Transfer No. 12" of the New York, New Haven and Hartford Railroad do such work every day in New York Harbor ... have been doing it since 1898.

These tugs have had many bearing installations and replacements. Their owners most certainly may be regarded as bearing authorities. For years they sought a long-lasting, trouble-free bearing. They experimented with many types. Their final choice is this new-type bearing ... made of *soft rubber* ... lubricated by water.

They have found that rubber offers less friction... less wear, when in contact

Goodrich *Cutless*

tug service . .



"Transfer No. 11" of the New York, New Haven & Hartford tug fleet. Equipped in June 1930 with Goodrich Cutless bearing for 9" shaft.

The New York, New Haven & Hartford tug "Transfer No. 12." Equipped in July 1928 with Goodrich Cutless bearing for 9 1-8" shaft.

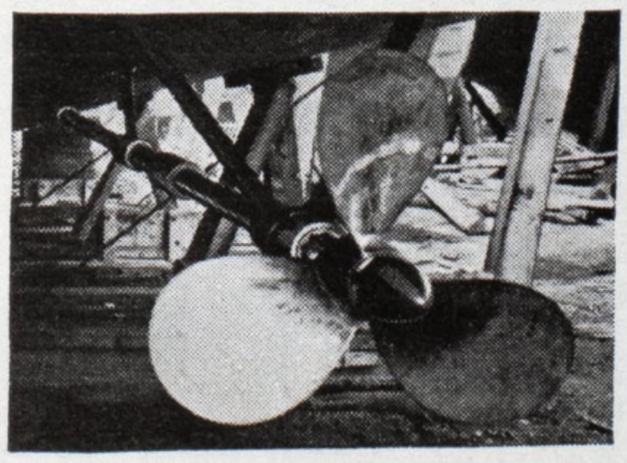
rubber bearing

with metal, than is possible when metal contacts metal or lignum-vitae.

Take as an illustration the automobile tire that slips on a wet car track. Just as smoothly . . . with as little wear . . . does a propeller shaft spin in the wet rubber sleeve of a Goodrich Cutless bearing.

No mud or sand can score the Goodrich Cutless bearing or the shaft it safely houses. Gritty particles are, of course, carried between shaft and bearing by the lubricating water. But they are rolled on the bearing's soft rubber surface into special grooves . . . thence washed right out by the passing water. No harm to either shaft or bearing . . . shaft vibration eliminated, frequent and expensive bearing renewals made unnecessary.

Let us send you a list and complete performance data of large vessels equipped with this soft rubber bearing. Write for catalog 931A to The B. F. Goodrich Rubber Company, (Established 1870), Akron, Ohio.



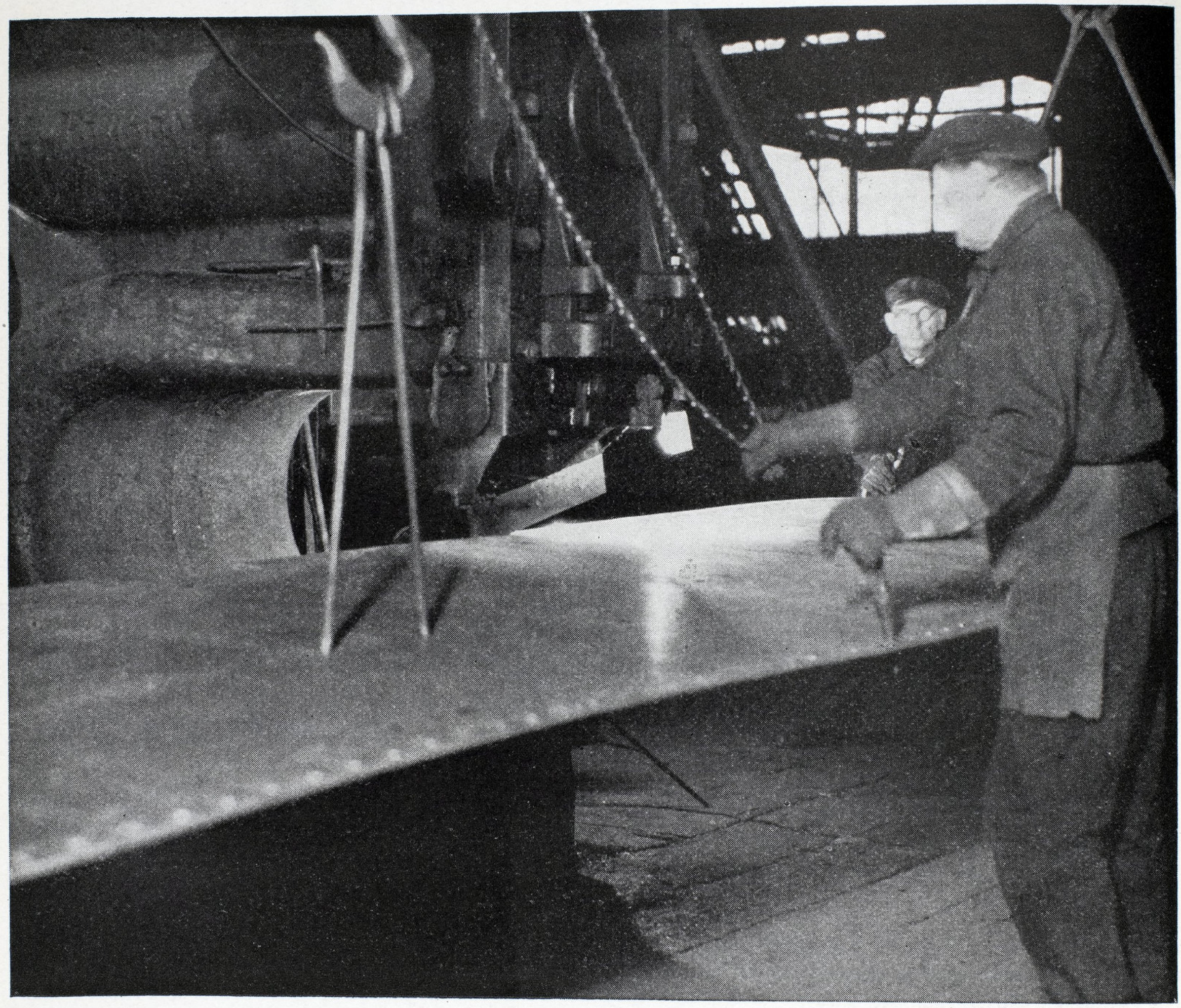
Twin screws equipped with Goodrich Cutless bearings of soft rubber. They are made in all sizes for all types of craft

Bearings

Another B. F. Goodrich Product

ACT UPON THIS IDEA •

It will save you money •



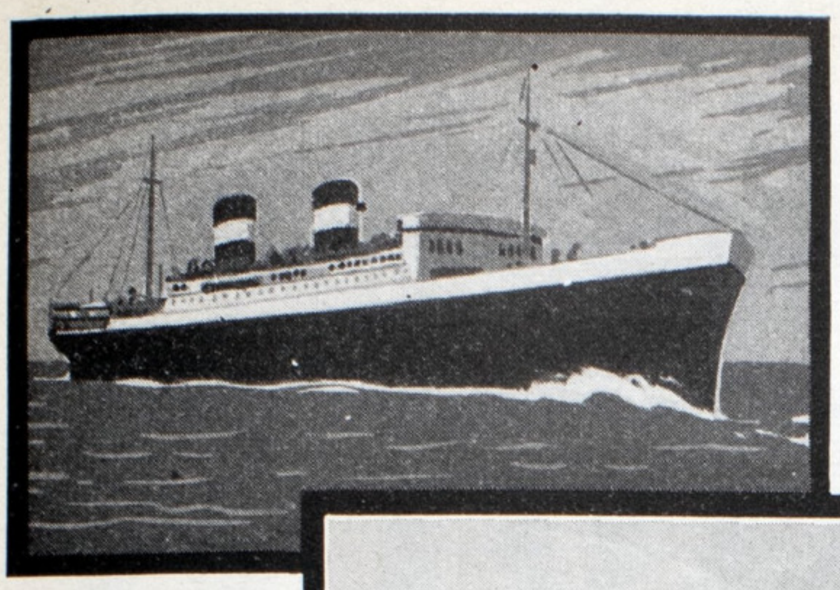
IF you have a ship repairing job or alterations to be done, why not let us do it for you now? Not for years has labor been more efficient or more interested, nor prices of raw materials so low.

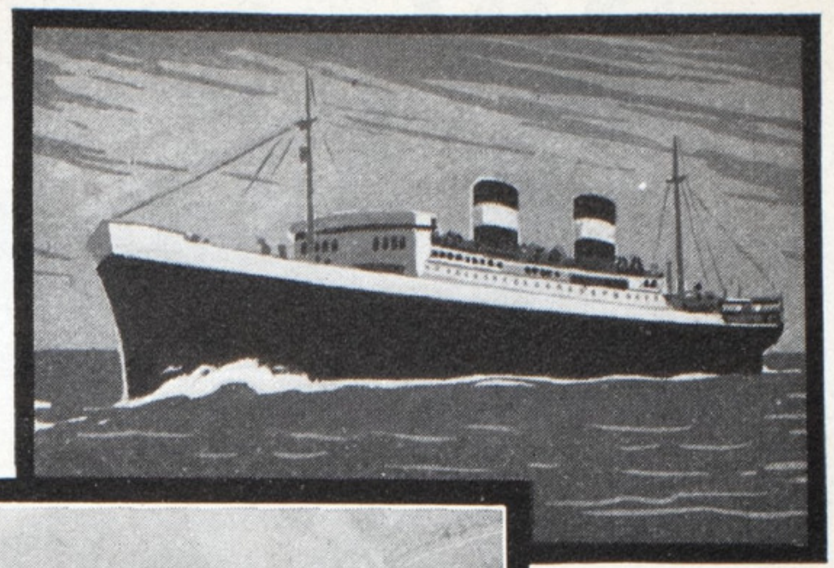
These facts, lower prices, quick results, and good work are good reasons for instructing American Ship to go ahead with your repair work—*Now.*

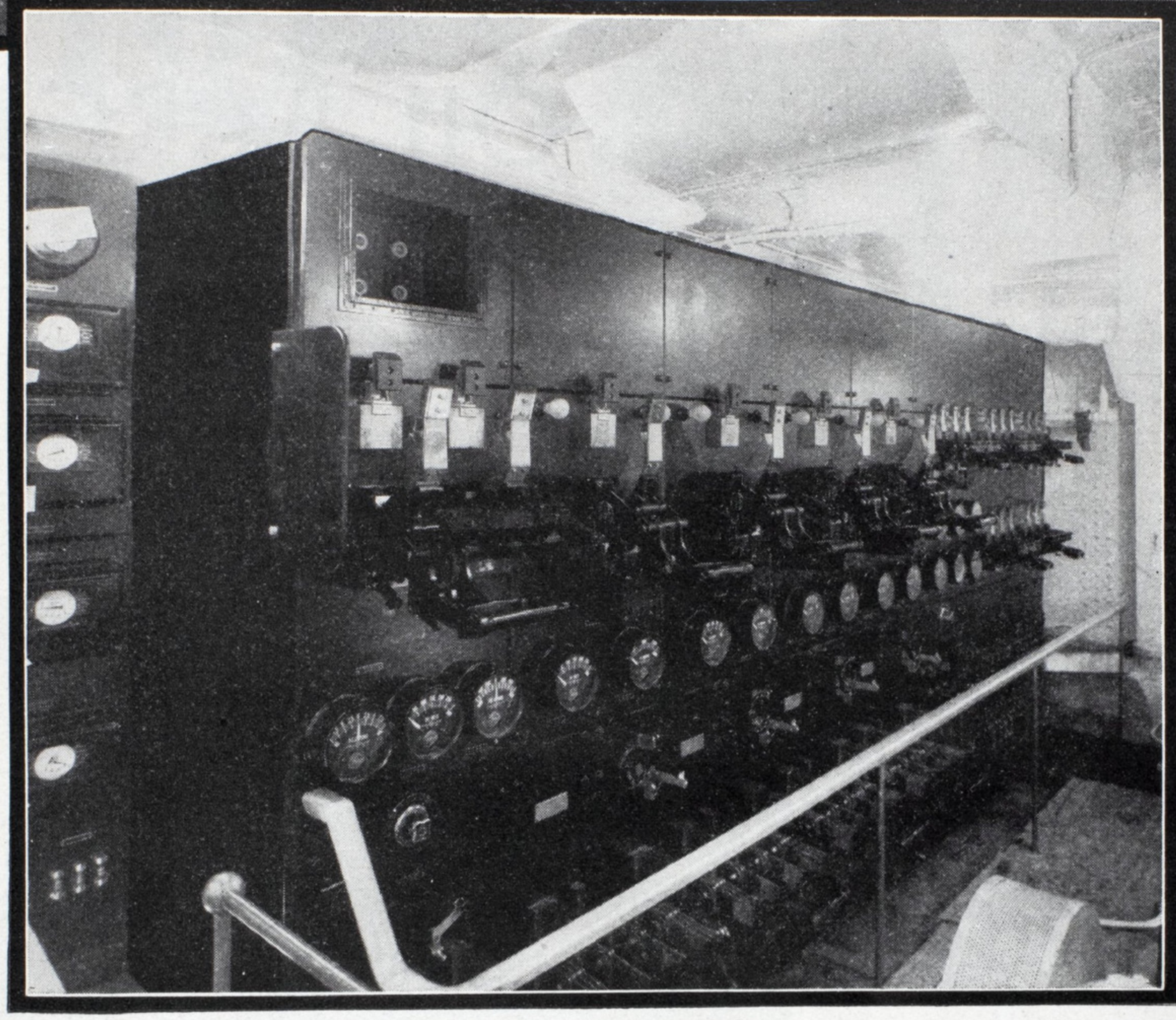
The AMERICAN SHIP BUILDING CO.

Main Office: Foot of West 54th Street, Cleveland, Ohio

CLEVELAND	LORAIN	BUFFALO	SOUTH CHICAGO	SUPERIOR
American Ship Building Co.	*American Ship Building Co.*	*Buffalo Dry Dock Company*	*Chicago Ship Building Co.*	*Superior Shipbuilding Co.*







PROTECTED BY I-T-E

THE new Dollar Line ships, President Coolidge and President Hoover, are equipped with I-T-E circuit breakers for the protection and control of the many electrical circuits that form the vital arteries of modern ships.

The I-T-E circuit breakers on these ships protect all of the power, light, heating, refrigerating and ventilating circuits against overload and short circuits, and also protect the main generators against reverse current. They insure the smooth operation of the ships and freedom from delays due to burned-out cables, motors and generators.

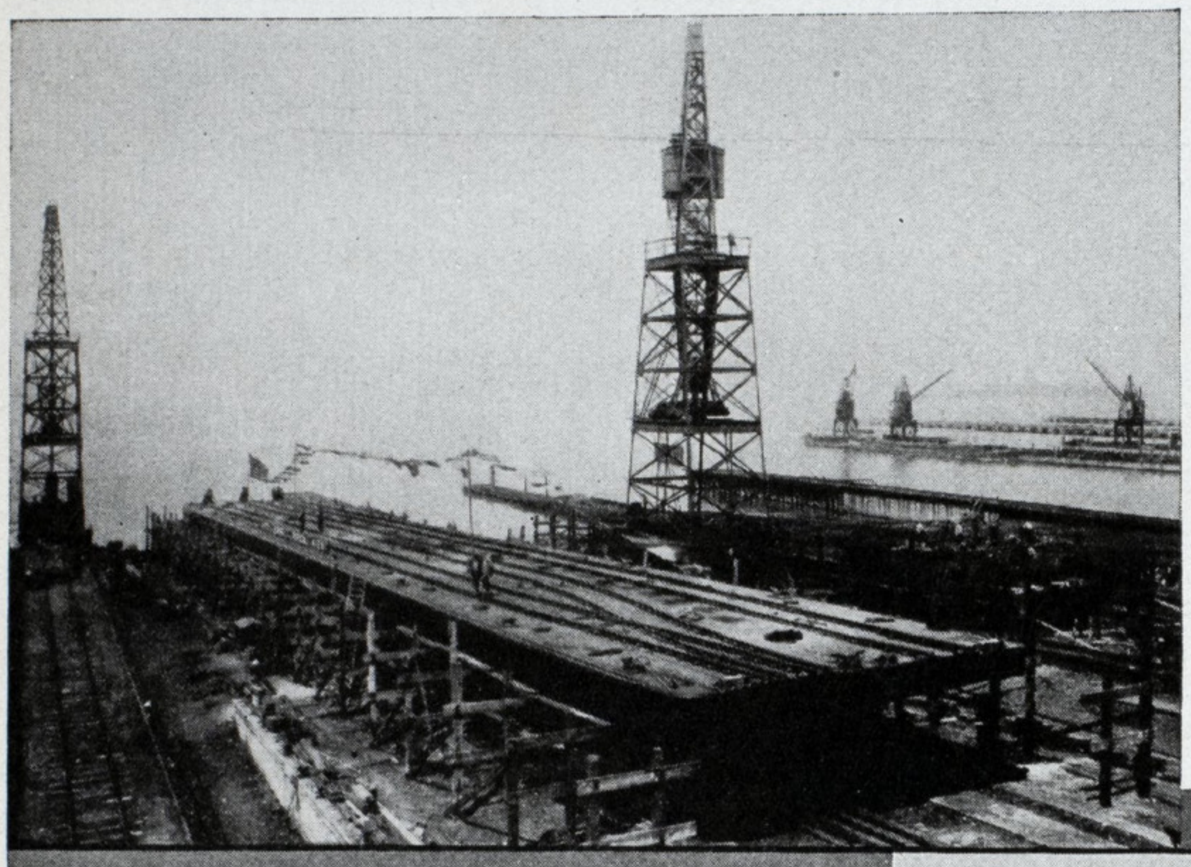
Pioneers in the design and manufacture of circuit breakers, I-T-E for over forty-two years has concentrated on the construction of dependable protective equipment, of the highest grade.

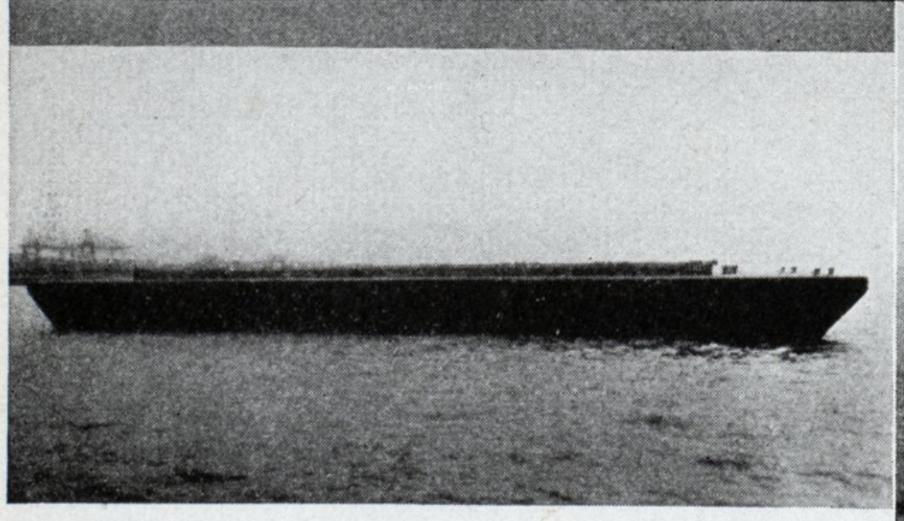
It is indeed fitting that the designers of these fine ships chose I-T-E circuit breakers.

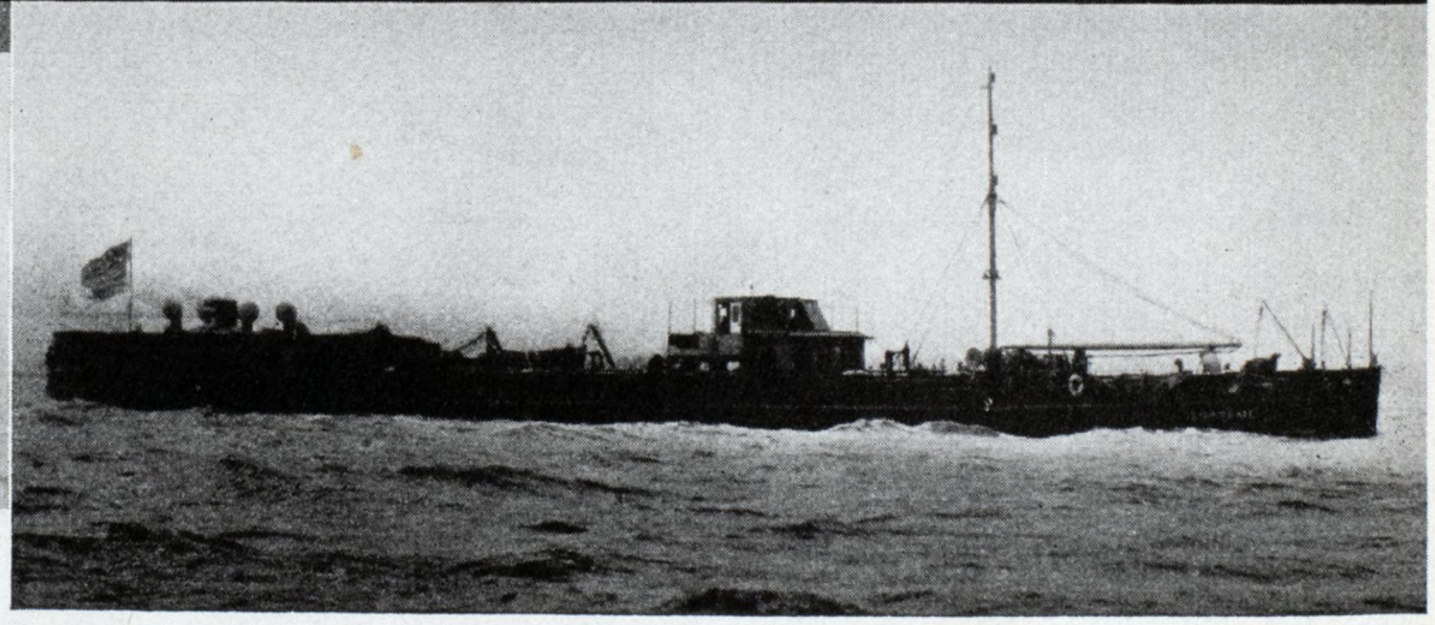
I-T-E CIRCUIT BREAKER COMPANY, 19TH AND HAMILTON STS., PHILADELPHIA

Birmingham, Crawford Bldg.; **Boston**, 201 Devonshire; **Buffalo**, Ellicott Sq. Bldg.; **Chicago**, 333 N. Michigan Ave.; **Cincinnati**, Union Trust Bldg.; **Cleveland**, Terminal Tower Bldg.; **Dallas**, Burt Bldg.; **Denver**, Tramway Bldg., **Detroit**, Penobscot Bldg.; **Duluth**, Providence Bldg.; **Kansas City**, Midland Bldg.; **Los Angeles**, 106 W. 3rd; **Minneapolis**, Plymouth Bldg.; **Montreal**, 151 Lagauchetiere St. West; **New Orleans**, 708 Girod St.; **New York**, 12 E. 41st St.; **Omaha**, Electric Bldg.; **Philadelphia**, 1505 Race; **Pittsburgh**, Grant Bldg.; **St. Louis**, Bank of Commerce Bldg.; **San Francisco**, Call Bldg.; **Seattle**, 802 33rd Ave.; **Tulsa**, 1619 South Columbia Place; **Toronto**, 9 Duke Street; **Vancouver**, 500 Beatty Street; **Winnipeg**, National Cartage Office Building.

WHO ★ is best qualified to build your CAR FLOATS OIL BARGES SCOWS ★







RAILROADS, oil companies and others are finding that Bethlehem offers decided advantages in the building of steel oil barges, car floats and scows.

The construction of such vessels has long formed an important part of the work of this organization; as a result, in handling your order Bethlehem draws on experience gained in building a large majority of the car floats, barges, and similar craft, constructed in the past few years for harbor and coastwise service.

Bethlehem has a large plant—the Sparrows Point works, on Baltimore Harbor, with ten building slips and other extensive facilities—specializing in the construction of vessels of this class. Moreover, Sparrows Point Works is adjacent to Bethlehem's steel mills, an unmatched source of supply for the material used in shipbuilding. This advantageous location promotes low cost and facilitates prompt deliveries.

Broad experience, complete facilities, nearness to source of material supply—these advantages enable Bethlehem to build car floats, oil barges, and scows that will meet rigid requirements, and give years of satisfactory, economical service.

BETHLEHEM SHIPBUILDING CORP., LTD.

General Offices: Bethlehem, Pa.

General Sales Offices: New York, 25 Broadway
San Francisco, 20th and Illinois Sts.

District Offices: Boston, Baltimore, San Pedro

BETHLEHEM STEEL

BETHLEHEM

Right Now!

The Marine Specialties devised and perfected by Messrs. J. Stone & Company, Ltd., Deptford, England, and used by the principal shipping companies throughout the world, are now available to American shipowners directly from the American Locomotive Company.

This is made possible through an arrangement by which the American Locomotive Company undertakes the manufacture and sale of

STONE'S MARINE SPECIALTIES

for the American market.

Our manufacturing facilities will enable us to give American owners the benefit of these well known devices at reasonable prices. The standard of workmanship and material long maintained by J. Stone & Company, Ltd., will be identical in the products manufactured by the American Locomotive Company.

We have established an organization especially to present Stone products to the shipping industry and shall be glad to have a representative call, or, if you prefer, to furnish you particulars of these specialties by mail.

American Locomotive Company

30 Church Street **New York, N. Y.**

You Say YOU WANT PROSPERITY

New Orleans & South American S. S. Company's Cargo ship "Santa Tecla"
Built by New York Shipbuilding Company

$1,100,000,000

is paid by American Citizens each year to ocean shippers for passenger fares and freight charges!

SOMEBODY gets the Lion's Share of this stupendous sum. **America** can be this **somebody**. It is our commerce. They are our own people.

To enjoy the privilege requires that Americans promote the growth of the American Merchant Marine by their **Patronage — that's all.**

Why not exercise our good business sense and **help to help ourselves?**

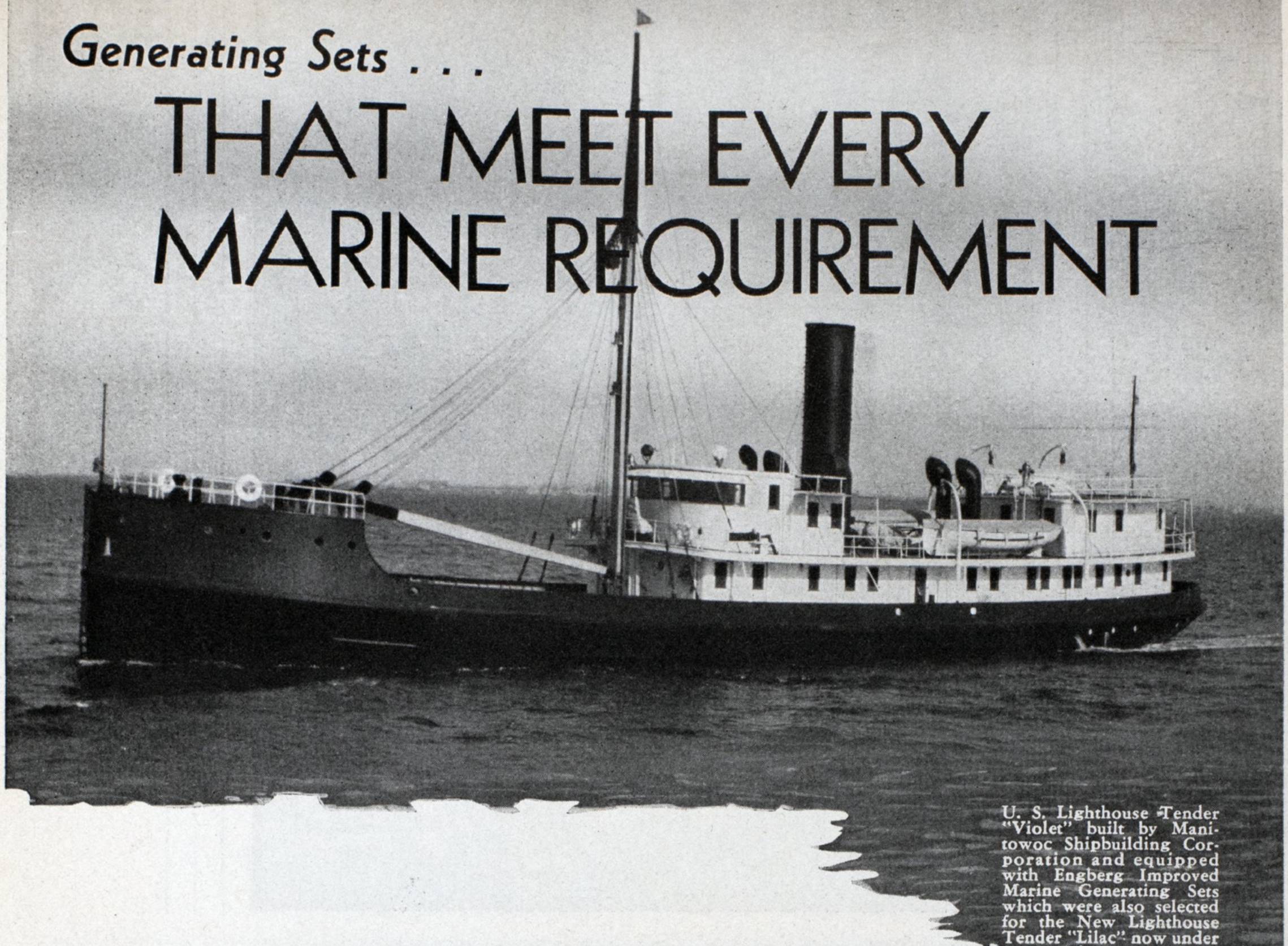
NEW YORK SHIPBUILDING COMPANY

Main Office and Works:
Camden, N. J.

New York Office:
420 Lexington Ave.

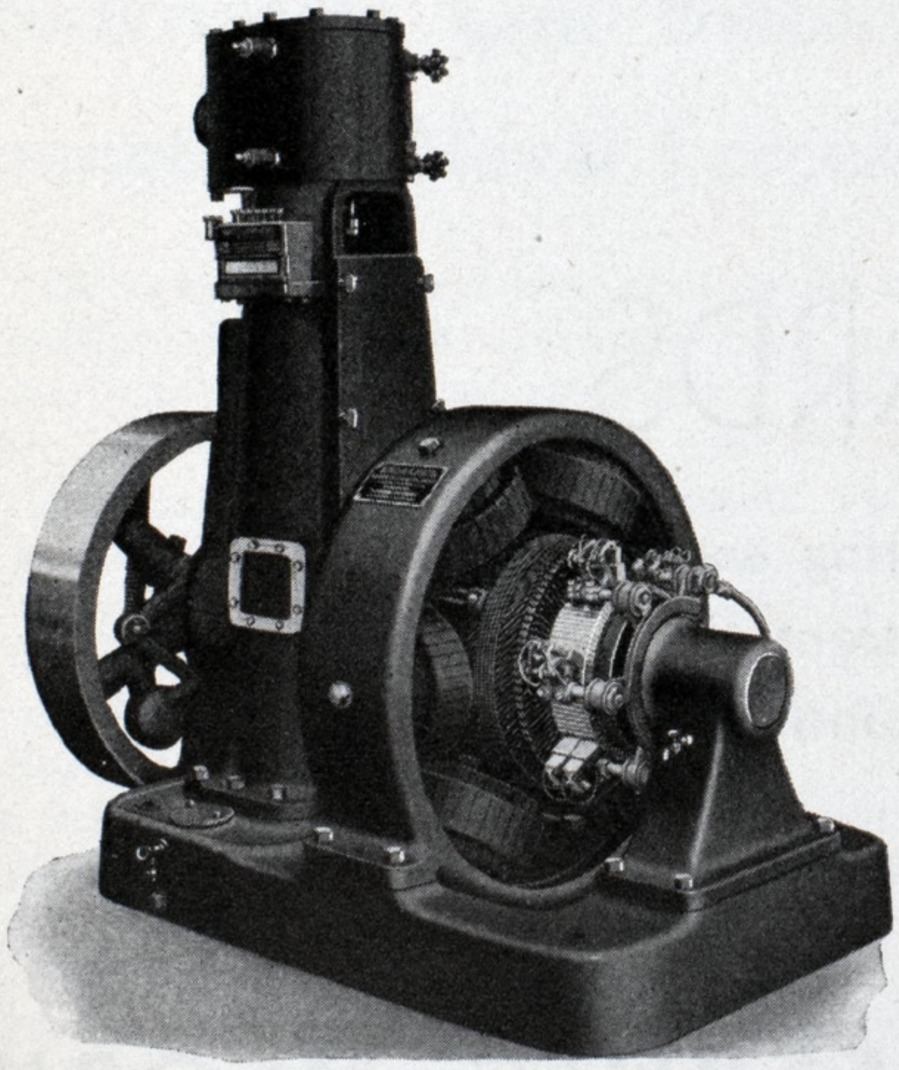
Generating Sets . . .

THAT MEET EVERY MARINE REQUIREMENT



U. S. Lighthouse Tender "Violet" built by Manitowoc Shipbuilding Corporation and equipped with Engberg Improved Marine Generating Sets which were also selected for the New Lighthouse Tender "Lilac" now under construction.

Designed and Constructed for Marine Service



DESIGN and construction based on forty years *successful analysis, successful construction* and *successful operation* of generating sets in marine service can have only one result—dependable, trouble-free service which cuts down operating costs and keeps them down. Critical users consistently specify Engberg Marine Generating Sets because they *know* this from *actual, comparative* operating results.

Engberg Generating Sets are fully enclosed, entirely self-oiling, operate without oil leakage and with or without cylinder lubrication. The new watershed prevents emulsification by keeping condensation out of the oil. Generous bearings and working parts, liberal use of chrome nickel steel, simple adjustments and a proven lubricating system guarantee long life.

TROY ENGINE & MACHINE COMPANY

2245 Railroad Avenue » Troy, Pennsylvania

TROY - ENGBERG

Horizontal and Vertical Steam Engines « » Generating Sets « » Generators « » Switchboards

M-31-5

Machine shop at Rivard Street, Detroit
where we build and repair engines

HIGHEST STANDARDS

of workmanship, engineering and service are ever apparent in Great Lakes built ships and engines—and repairs.

GREAT LAKES ENGINEERING WORKS

Shipbuilders and Engineers

General Offices

River Rouge, Michigan

Cleveland Office: Union Trust Bldg.

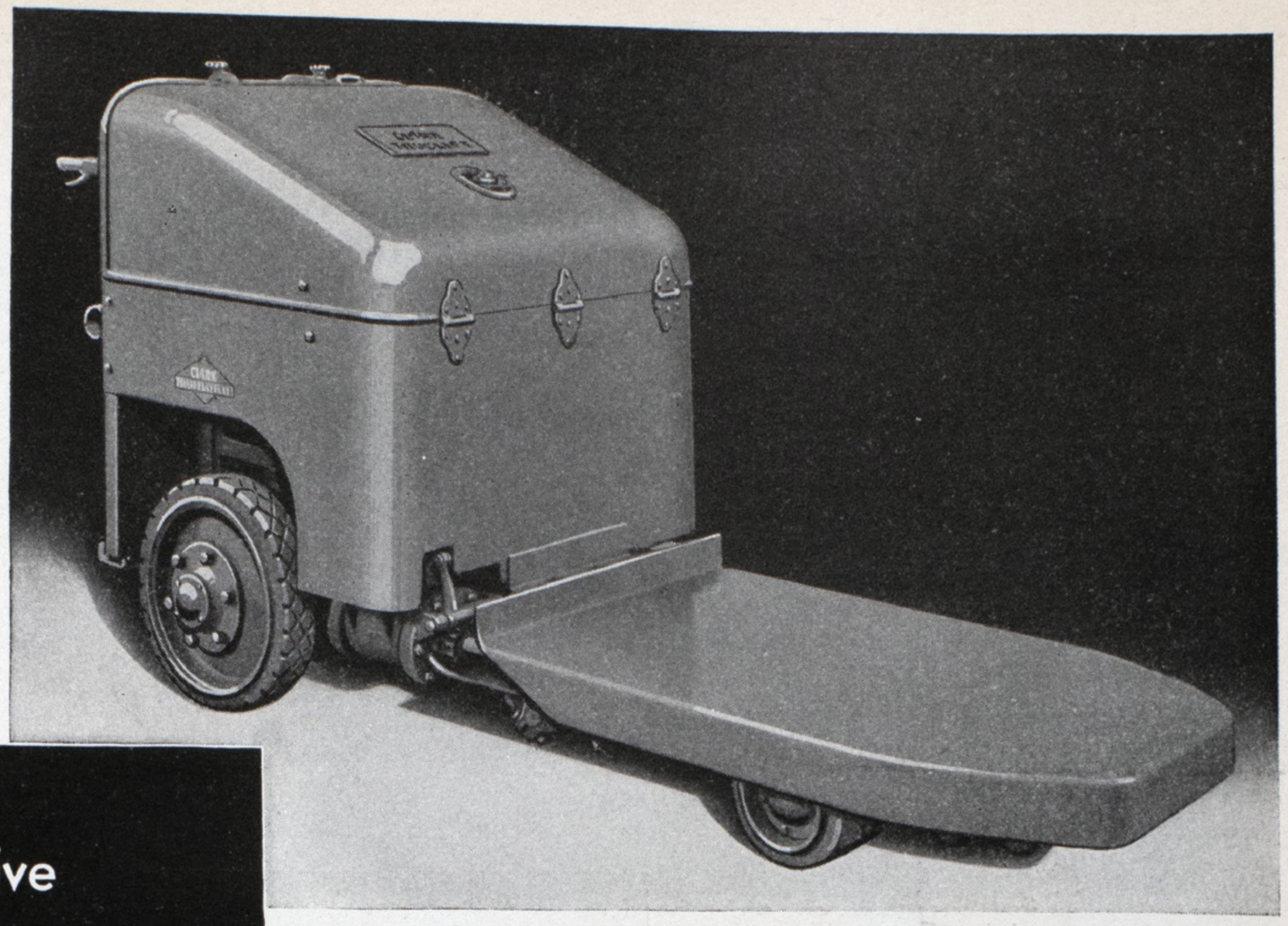
Engine Works Equipped For General Heavy Machine and Foundry Work

Detroit, Michigan

Complete Shipbuilding Dry Dock and Repair Facilities

River Rouge, Mich., and Ashtabula, Ohio

Four-ton model. Low narrow platform to accommodate U. S. standard 12-in. under - clearance skids. Wide tires under load mean low tire wear.



4-wheel steer
Rear wheel drive

24-hour continuous operation

94-inch turning radius

The NEW Clark "Truclift" has everything!

Maximum flexibility—no other lifting truck of equal capacity can turn in a 94-in. radius. The New Clark "Truclift" can! Greater power economy—*all the load is pay load!* Greater power efficiency—direct gas drive, capable of 24-hrs. continuous operation and just as potent the last hour as the first!

Agile as a cricket—turns the corner of two intersecting 64-in. aisles with room to spare. Load always under the driver's eye. No gear shifting. Automatic brake sets when driver steps off platform. Any man who drives a car can operate it—any mechanic can service it.

Clark "Truclift" craves no rest. Its platform is deftly slipped under the load and lifts it quickly. It speeds away through narrow aisles, up ramps, over tough going—gets into and out of side ports easily.

Cuts the cost of handling cargo on shipboard, on pier, in box cars. Pays for itself quickly at any terminal where ships tug at their moorings, impatient to be off to sea.

Capacity—Built in two models, 3-ton and 4-ton. Eleven other standard models.

Speed—1 to 6 mi. per hr.

Power—Tractor type gas engine, delivering power to large rear driving wheels through direct transmission. Gears run in oil.

Lift—Hydraulic lift elevates the load in 8 sec. Driver starts the lift, mechanism completes the operation.

Operation—Simple controls, positive brakes, rapid acceleration under load, easy 4-wheel steering.

Write for new "Truclift" Bulletin describing two "Truclift" models and two new tiering models.

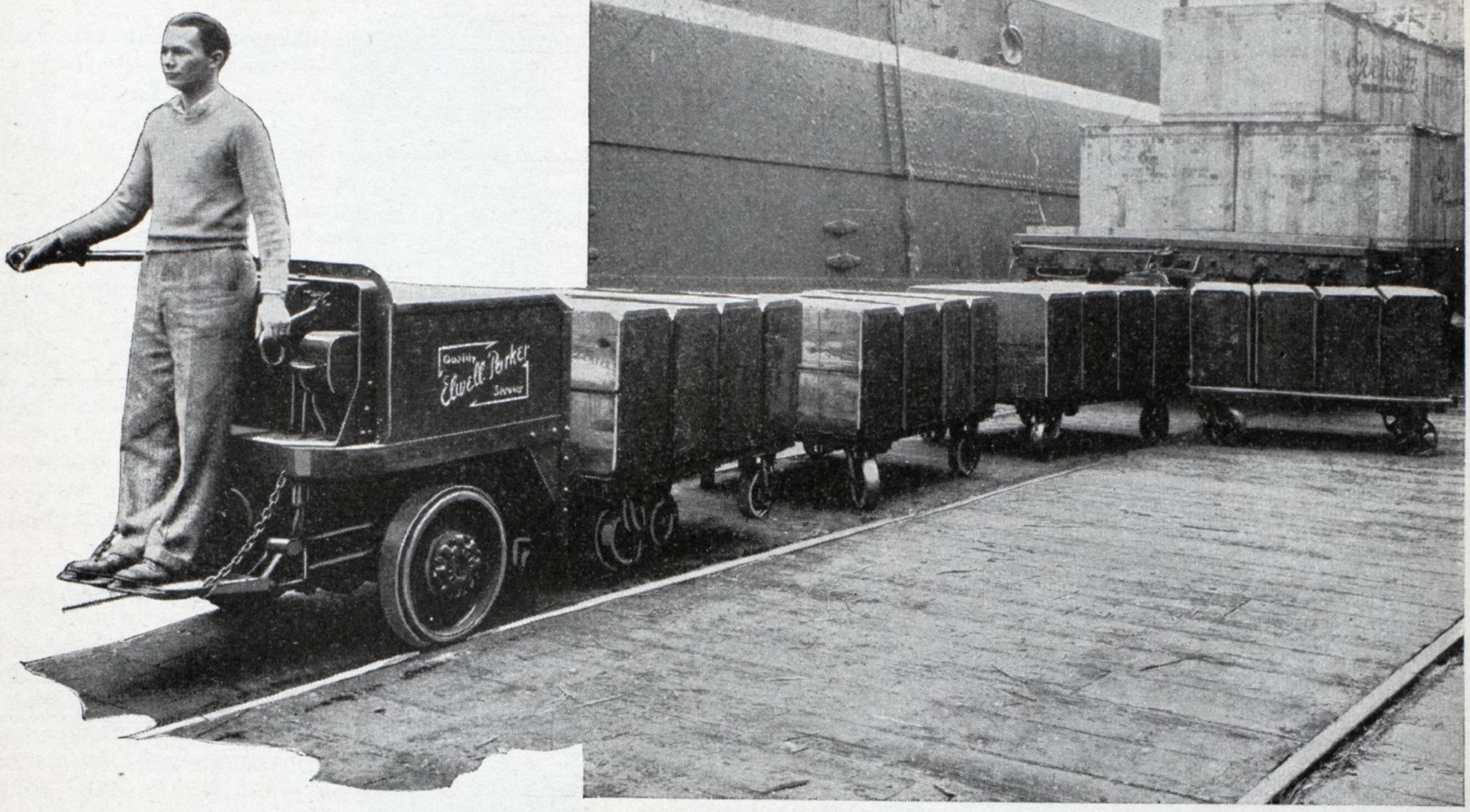
The Clark Tructractor Co.
Battle Creek, Mich.

Attach this ADVERTISEMENT to your inquiry

Speed cargo handling

A ship earns money at sea —not at the wharf

Elwell-Parker Gives You *Exclusive Safety Features*



TO protect the operator, other workmen, the truck, the pay load and adjacent equipment, Elwell-Parker provides many exclusive safety features by a self-operating interlocking power control.

With an Elwell-Parker at rest, no motion can be given to the truck unless the operator stands on the pedals with all starting and control levers in an "off" position. Power must always be applied through first, second and third safety speeds. The truck cannot be started without passing through first speed position. When the operator steps off the truck, all controls return at once to "off" position and brakes are applied.

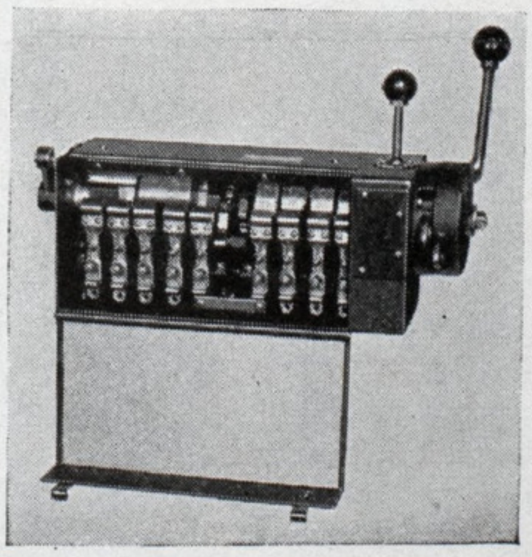
Another equally important *exclusive* Elwell-Parker safety feature is the separate operation of the brake from the main switch. By this arrangement, the power pedal, when depressed, applies current. Then, as the main drum is moved to speed position, the brake is gradually released and the truck picks up speed. On ramps, this system affords maximum safety, for an Elwell-Parker can be stopped and started at any point—it is not necessary to release brake to apply power. For descending steep ramps, a dynamic brake controller can be provided.

All motors in Elwell-Parkers are Elwell-Parker built—heavy duty types to meet extraordinary operating conditions—safety again in the assurance of the ability of the motors to take all the power the battery will deliver. There are no fuses in the electric circuits to blow, when an abundance of power is required.

Every part of the truck is built to withstand the hardest usage. Many parts are alloy steel of chrome and vanadium—most parts are drop-forged and heat treated to give greater strength. For example, the drive shaft is so strong that it can be twisted in excess of 9° before it will refuse return to its initial position and must be twisted to 24° before it will fracture. Strength of parts is another assurance of safety.

Elwell-Parkers also protect your floors, because they are equipped with the largest diameter tires used on any electric industrial trucks.

A quarter of a century of accumulated experience in meeting handling problems is available to you through the nearest Elwell-Parker Field Engineer. He is ready to help you develop a system for handling your materials in the most economical manner. Write The Elwell-Parker Electric Company, 4200 St. Clair Ave., Cleveland, Ohio, for details.



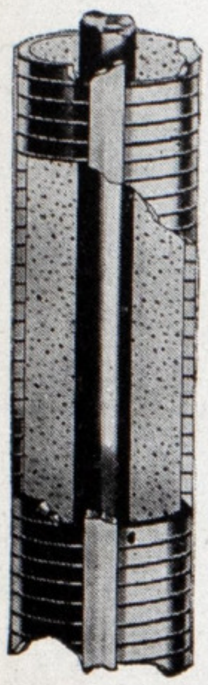
The Elwell-Parker travel controller. Heavy duty type with extra large capacity contacts, self-returning and interlocking. Provides three speeds in either direction.

ELWELL-PARKER

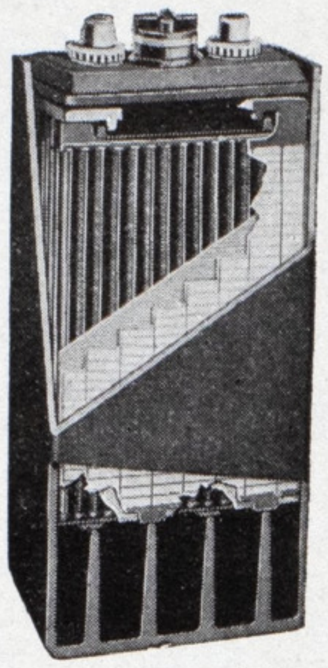
DESIGNERS AND BUILDERS OF ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND CRANES FOR OVER A QUARTER CENTURY

OPERATING COSTS CUT TO THE BONE

WITH EXIDE-IRONCLAD BATTERIES

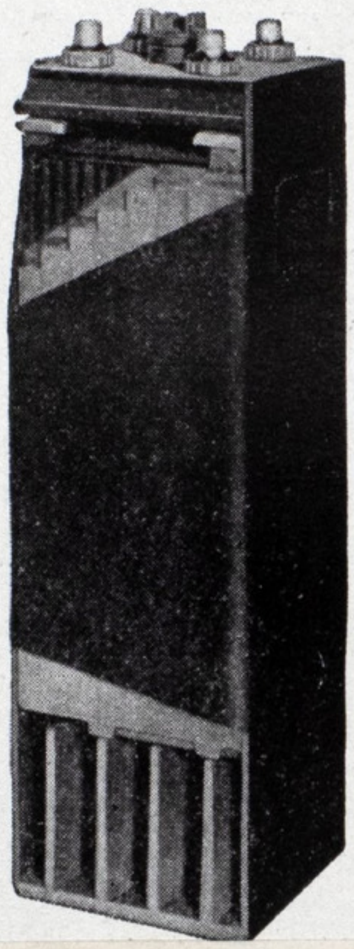


(*at left*) Cross-section of slotted rubber tube. Shows how active material is kept in, yet allows free access of electrolyte.



(*at right*) Cut-away section of the famous MVA type cell. Note construction is same as TL Type.

(*at right*)
Cut-away TL type cell showing famous Exide-Ironclad construction. There's not another battery construction like it. Positive plates are composed of finely slotted hard rubber tubes (see photo above at left). It's this different construction that makes Exide-Ironclad last so long in industrial truck service.



TIME AND MONEY SAVED—dependability assured, with this Type TL Exide-Ironclad Battery in your trucks. It is rugged, long lived and has plenty of reserve power for extra-heavy loads . . . 43% more capacity—more work, more miles per charge.

IF you are looking for a way to lower your operating costs, use Exide-Ironclad Batteries in your electric industrial trucks. These sturdy, powerful batteries—because of their great reserve power, low maintenance cost and unusually long life—enable your trucks and tractors to deliver the kind of service that cuts operating costs to the bone.

This is especially true where the new Type TL Exide-Ironclad Battery is used. Plate for plate, it has the same thickness and width as the popular Type MVA, and the same remarkable construction. In providing this battery of greater capacity . . . one that will do even more work per charge than Type MVA, yet fit in existing battery compartments . . . the plates of Type TL have been made slightly higher (4-7/8 inches in sizes from 15 to 29 plates).

THE ELECTRIC

THE WORLD'S LARG

COOPER-BESSEMER ENGINES MAKE PROFITABLE PARTNERS *For Cargo or Fishing Boats*

YOU'RE always safe in choosing a Cooper-Bessemer diesel engine as your partner in any boat enterprise.

Ask the fishermen who own Cooper-Bessemer powered boats. You'll get the kind of recommendations that really count. These men depend on the satisfactory operation of the engine for their profits. Lazy, shirking engines are not tolerated in fish boat service.

When you want boat power that will carry its load in a profitable partnership, ask for our literature.

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Hoffar's Lt'd., 1790 Georgia St. W., Vancouver, B. C., The Pacific Marine Supply Co. 1213 Western Ave., Seattle, Wash.
PLANTS: MOUNT VERNON, OHIO GROVE CITY, PENNSYLVANIA

The *Andrew and Rosalie,* 86' fishing schooner, owned by Liborio Curcuru is powered with a 150 H. P. Cooper-Bessemer marine diesel engine which gives her a speed of 10 knots.

COOPER-BESSEMER

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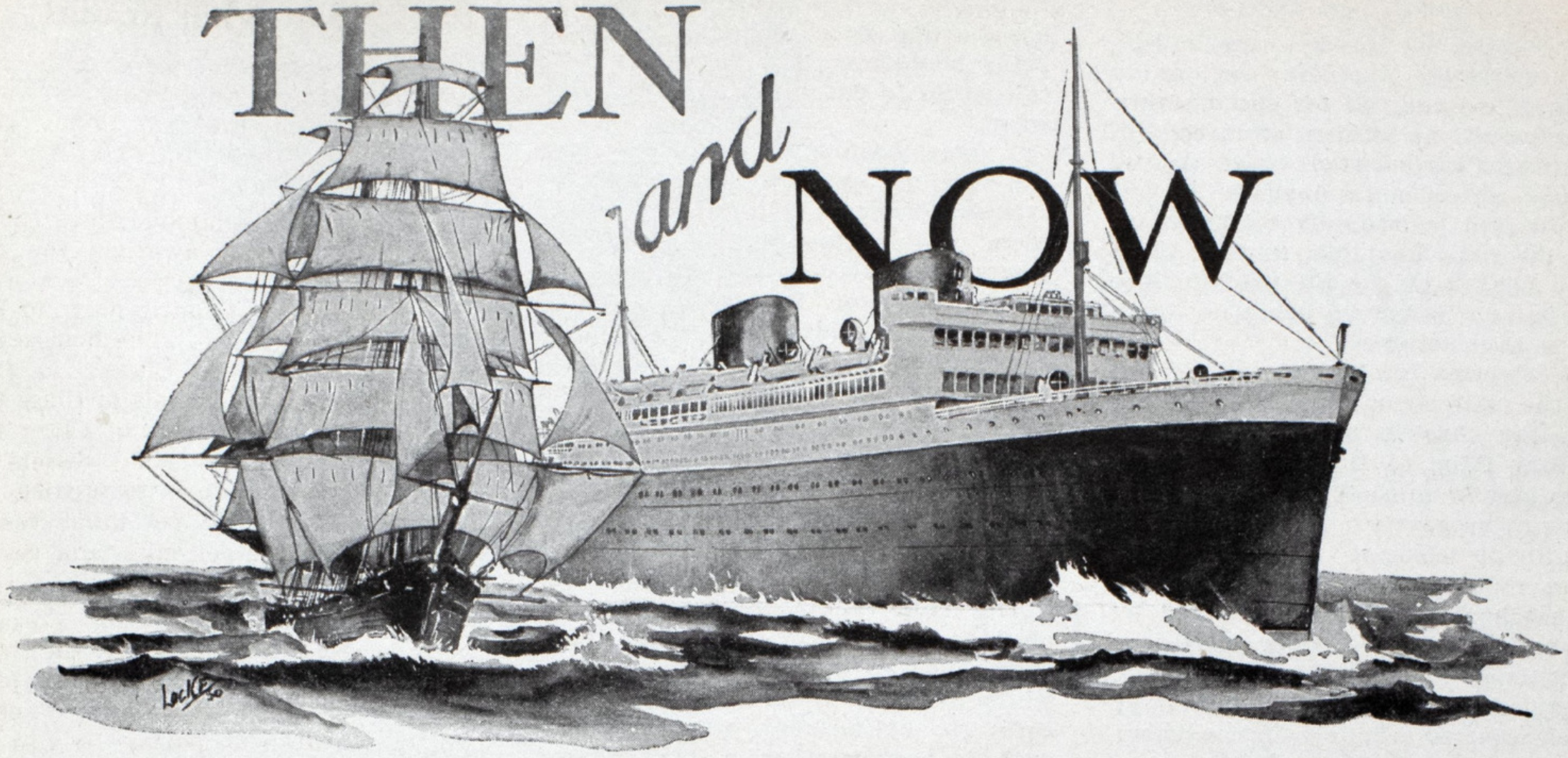

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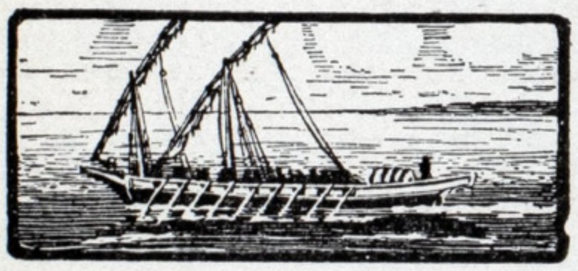

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CHINESE JUNK

THROUGHOUT the ages men have used water transportation. One of the earliest known means of conveyance was the Coracle of ancient Britain. Then came the Viking ship and the Trireme of ancient Rome. The Felucca, Spanish Galleon and Chinese Junk were the forebears of the full-rigged and clipper ships, the highest types of vessels propelled by wind and sail.

A new era in transportation began with the advent of steam and has progressed until it is now necessary to use every reasonable device known to science to obtain maximum efficiency and economy in the vessel of today.

To this end no apparatus developed in recent years adds more than the Sperry Gyro-Compass and Gyro-Pilot.

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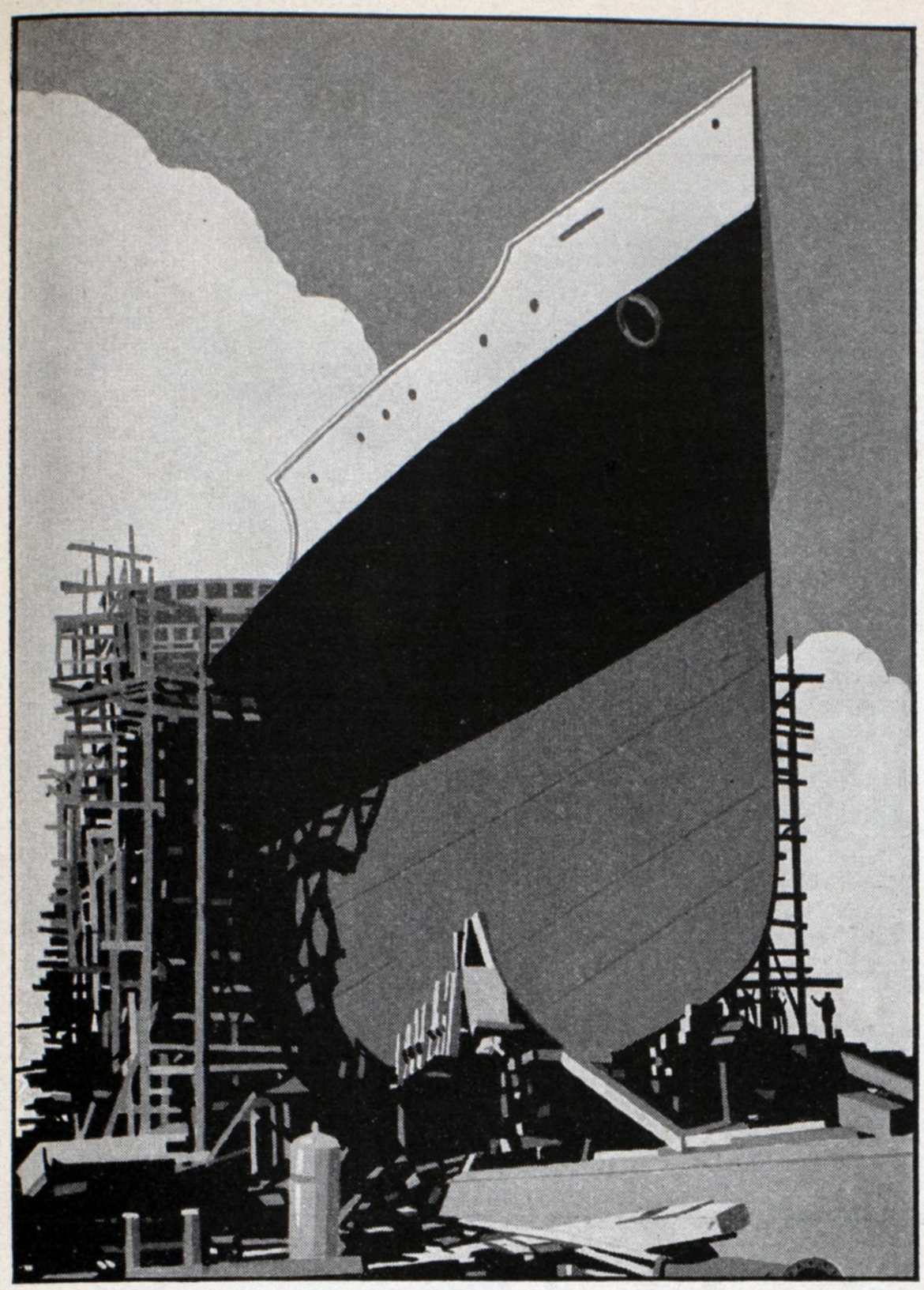

SIX NEW MERCHANTMEN ALL ELECTRIC

The growth of electric propulsion is coming to be measured not by single keels but by fleets. Six new passenger-cargo ships will soon be plying between North and Central American ports—a practical indorsement by the United Mail Steamship Company of electric drive. • And also an indorsement of General Electric design and manufacture. From the turbine-electric drive to the smallest ship's auxiliary, the equipment embodies the superior utility and dependability by which G-E marine engineering is now recognized on every sea. • Each ship of this fleet will be 444 feet long with a 60-foot beam and will accommodate 100 first-class passengers besides freight. Two, the *Talamanca* and *Segovia*, have already been launched. • The experience of G-E engineers enables them to offer expert advice in the selection of electric equipment exactly suited to each ship. It may be turbine-gear or turbine-electric or Diesel-electric drive; in each case, the recommendation will be based on sound technical principles and proved practices.

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GENERAL ELECTRIC

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What a satisfaction to get ahold of a Columbian Tow-Ro Line! It's the last word in easy handling regardless of how wet it becomes. The reason for such unbelievable flexibility is the scientific Columbian method of waterproofing — a method which has proven superior to every other.

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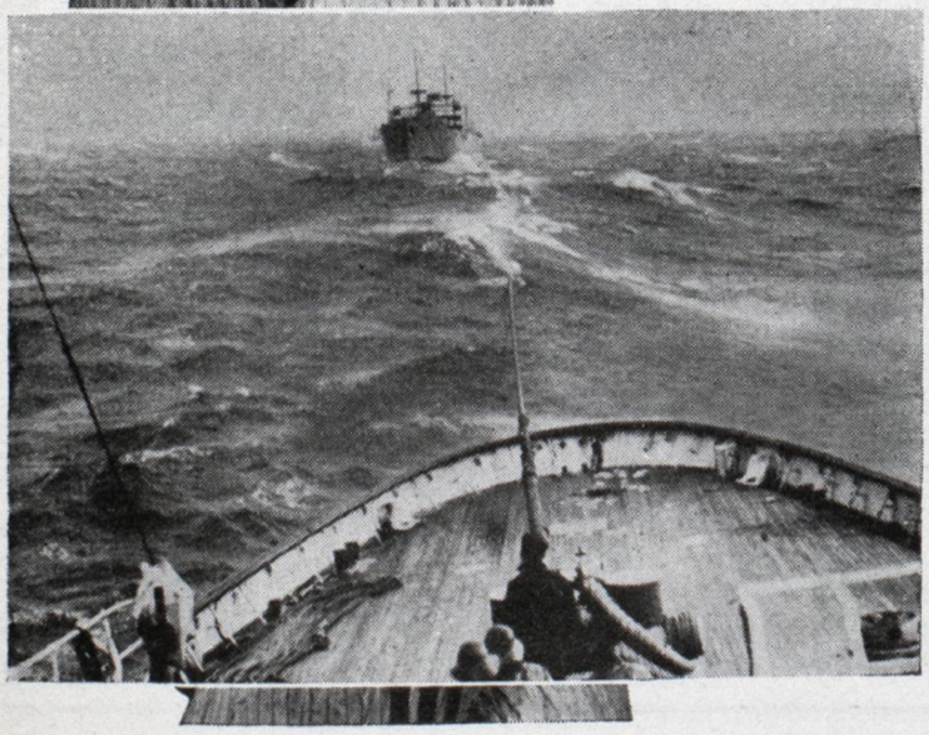

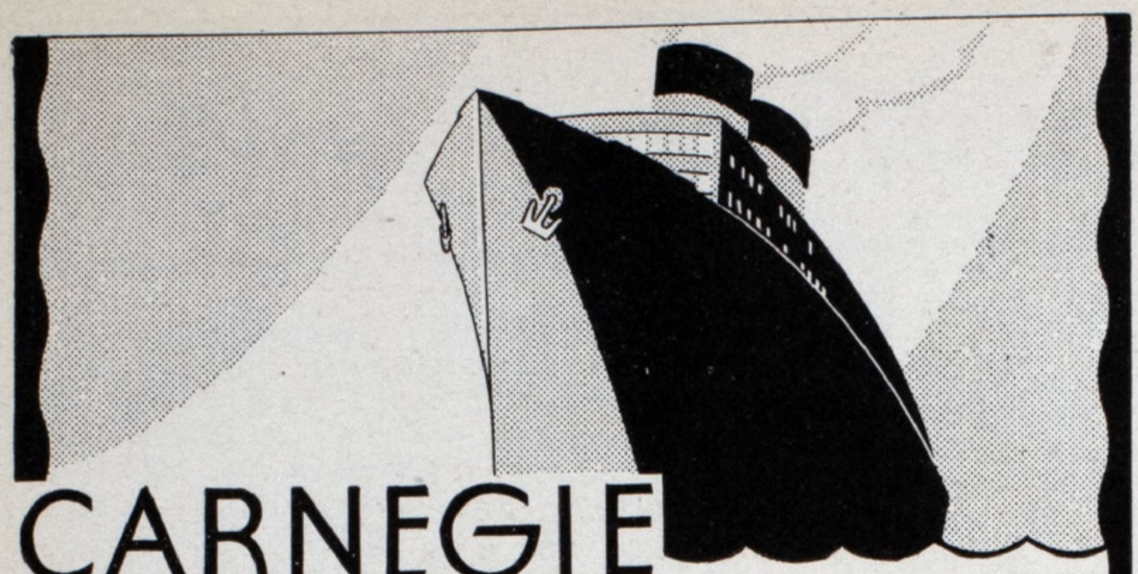

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The name "Carnegie" has been identified with steel manufacture for nearly three-quarters of a century—a good name to look for on Steel.

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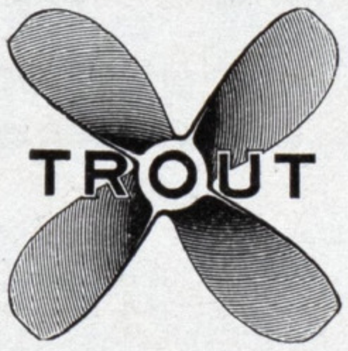

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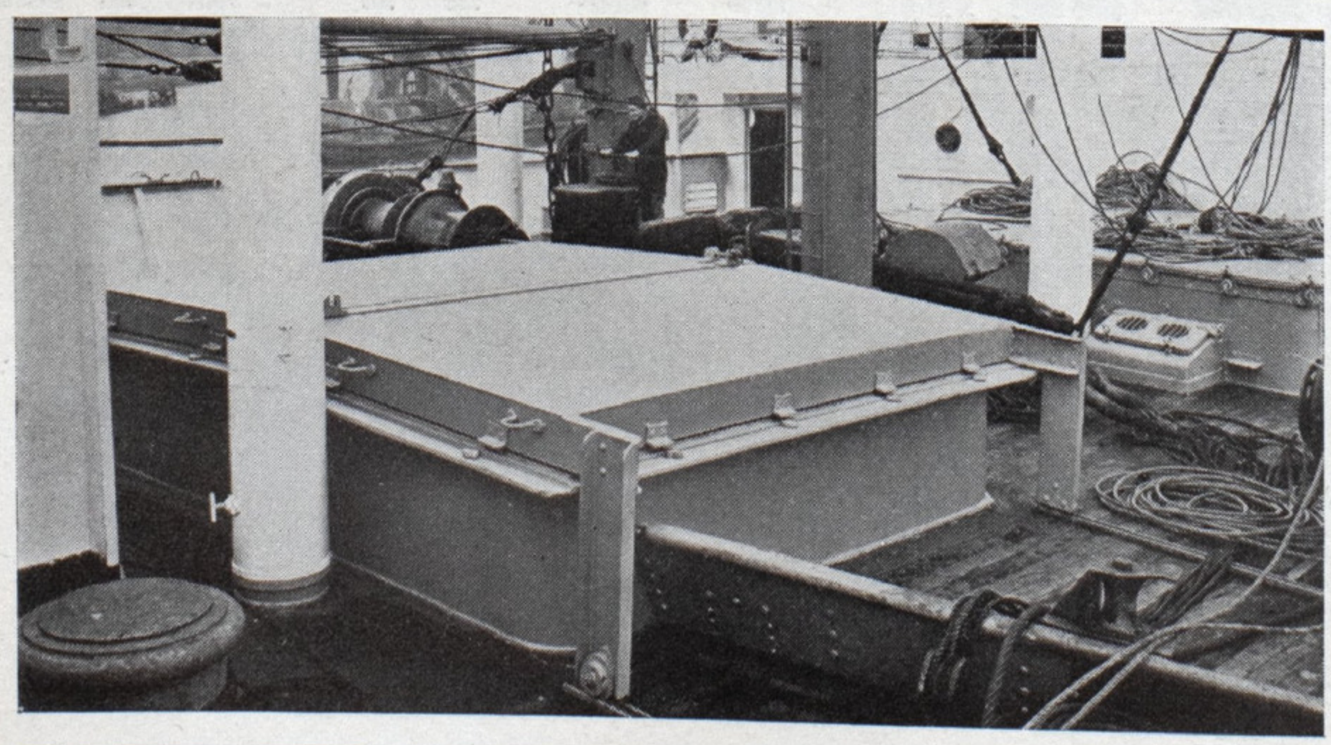

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For weather decks and tween decks

Strong as the deck.
Opened by 2 men in 2 minutes.
No upkeep and renewals.

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"MACANKING" Covers can be arranged:—

1. To roll to sides as cargo platforms.
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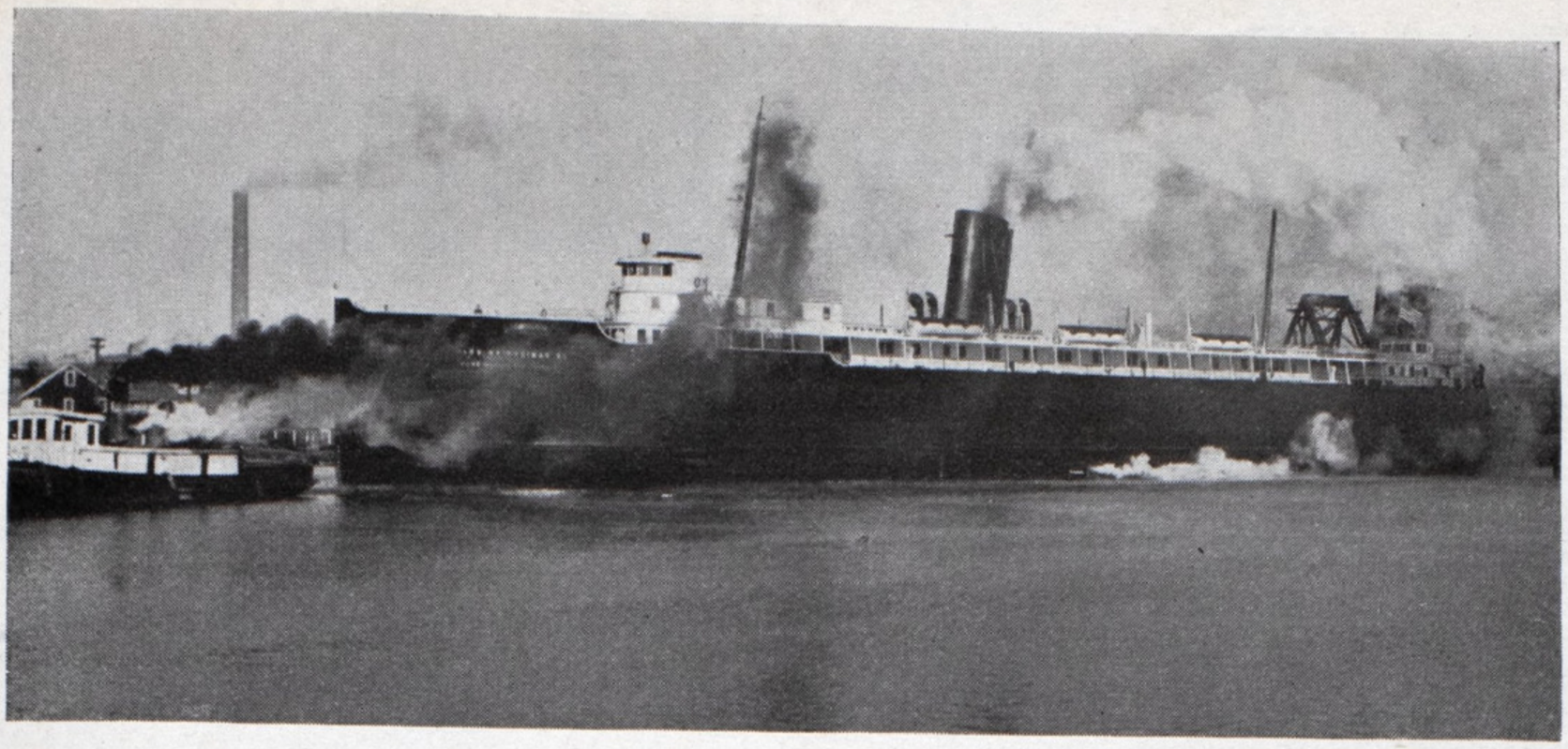

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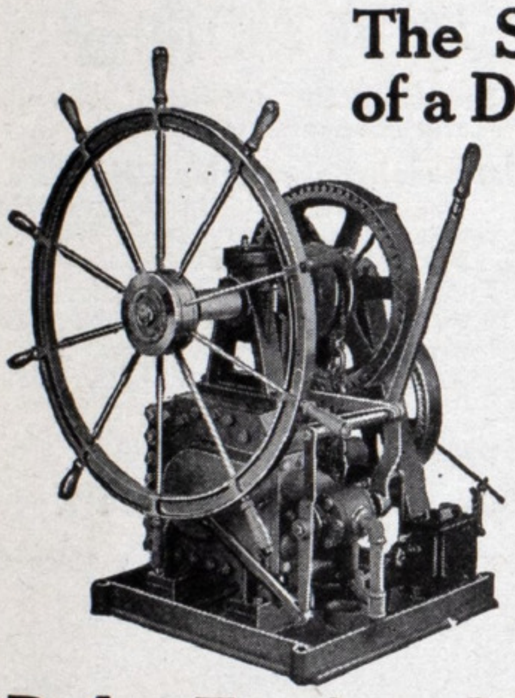

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Ask any skipper who is shipmates with one

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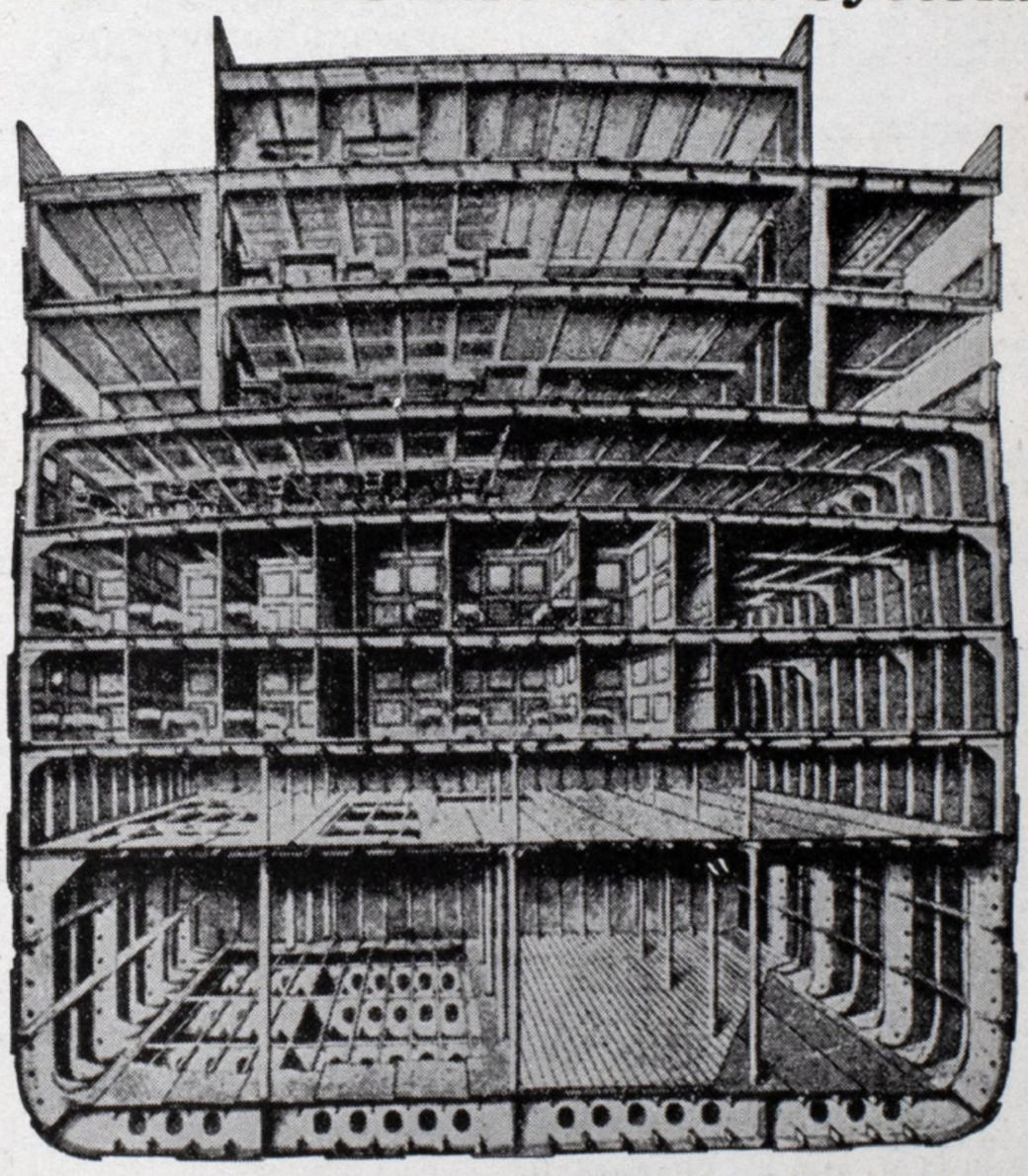
Isherwood Combination System



Sectional View of Interior of Passenger Liner designed on the Isherwood Combination System

(In a vessel of this type, deep transverses are recommended for hold construction, but are not essential.)

Adaptable to any type but particularly advantageous for passenger liners.

Shipowners are advised to specify that plans and structural arrangements should be approved by

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Post yourself on the advantages of Diesel power in all important marine services

Bulletin 123. Diesel Engines for Motorships

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Bulletin 98. Diesel Engines for Dredges

Explains Diesel and Diesel-electric main pumping power and auxiliary Diesel-electric power on hydraulic dredges, and all-Diesel operation of sea-going hopper dredges, with details of hydraulic dredges and of the largest sea-going hopper dredges in U. S. Government service.

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As McIntosh & Seymour Engines have achieved marked success and are available for almost all important main and auxiliary service, these bulletins afford authoritative reference on correct machinery practice.

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Division of American Locomotive Company

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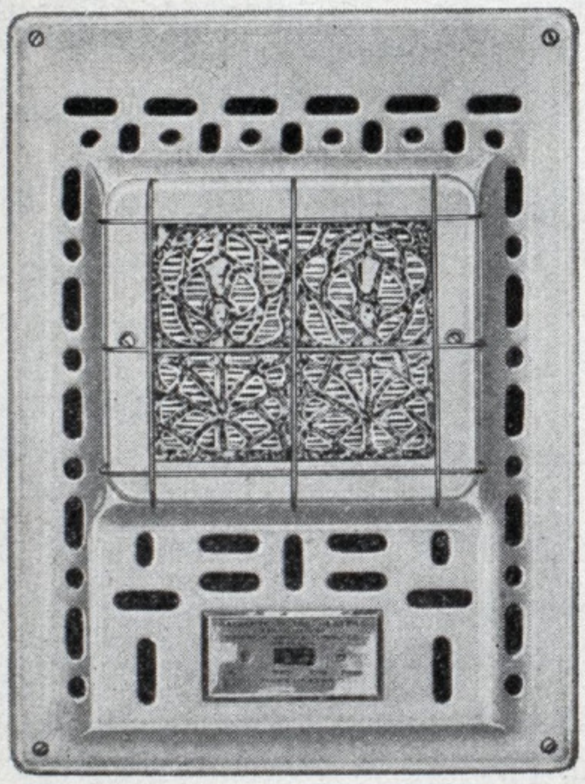
INSTANT HEAT ALWAYS READY



Model	Volts	Rating
102B	110	1200 Watts

Dimensions

Frame:	14⅜" Wide	19½" High
Body	12⅜" Wide	17½" High

Finishes: White, Ivory, Green and Orchid.
Requires No. 10 wire for connection.

At a snap of a switch your passengers can heat their staterooms to their liking.

Add to the comfort of travel and increase traveling. ***Write for full details.***

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CARNEGIE, PA. *2

DEAN BROS.

MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex
Piston Type & Plunger

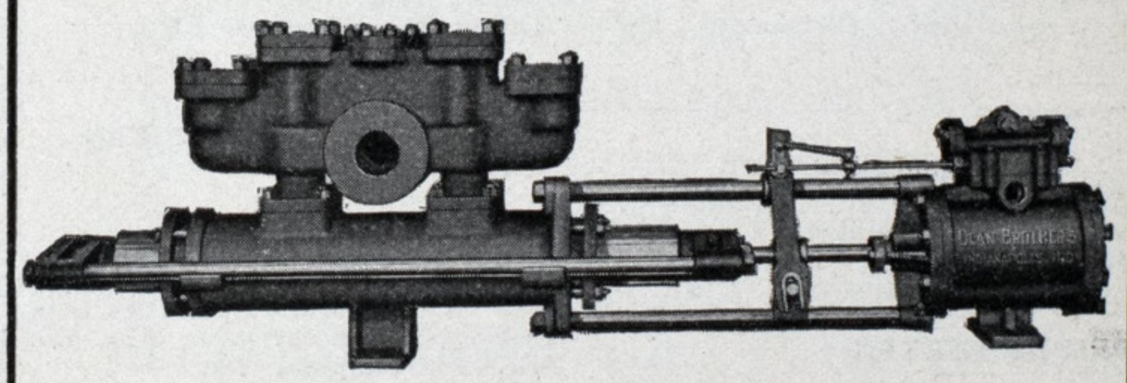


Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

ESTABLISHED 1869

DEAN BROS. COMPANY

MANUFACTURERS OF PUMPING MACHINERY FOR ALL PURPOSES

323 WEST TENTH ST.

INDIANAPOLIS IND.

ENGINES (Marine) Cont.

Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks Inc.,
11 Broadway, New York City.

ENGINES (Oil)

Cooper-Bessemer Corp., The,
Mt. Vernon, Ohio.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.

ENGINES (Steam, Steering)

Dake Engine Co.,
Grand Haven, Mich.

ENGINES (Vertical, Enclosed, Self Oiling)

Troy Engine & Machine Co.,
Troy, Pa.

EUROPEAN STEAMSHIP LINES (Passenger and Freight)

Hamburg-American Line,
39 Broadway, New York City.

EVAPORATORS

Griscom-Russell Co.,
285 Madison Ave., New York City.

FANS

Diehl Mfg. Co.,
Elizabethport, N. J.

FANS (Electric)

General Electric Co.,
Schenectady, N. Y.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

FEED WATER HEATERS—See HEATERS AND PURIFIERS (Feed Water)

FEED WATER REGULATORS

Babcock & Wilcox Co.,
85 Liberty St., New York City.

FIRE BRICK

Babcock & Wilcox Co., The,
85 Liberty St., New York City.

FLOOR PLATES

Carnegie Steel Co.,
Carnegie Bldg., Pittsburgh, Pa.

FOUNDERS

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co.,
Camden, N. J.

FREIGHT SERVICE

Hamburg-American Line,
39 Broadway, New York City.

FUEL OIL

Vacuum Oil Co.,
61 Broadway, New York City.

GAGES (Water)

Jerguson Gage & Valve Co.,
Somerville, Mass.

GEARS (Electric)

General Electric Co.,
Schenectady, N. Y.

GEARS (Marine Equipment)

Westinghouse Electric & Mfg. Co.,
So. Philadelphia. Pa.

GENERATING SETS

General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.

GENERATING SETS (Direct Connected)

Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

GENERATORS

Diehl Mfg. Co.,
Elizabethport, N. J.
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

GREASE

Vacuum Oil Co.,
61 Broadway, New York City.

GREASE (Launching)

Vacuum Oil Co.,
61 Broadway, New York City.

GYRO-PILOT (Automatic Steering)

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

HATCH COVERS (Steel)

MacGregor & King, Ltd., 5 Lloyd's Ave., London, E.C.3, Eng.

HAWSERS (Manila)

Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

HEATERS (Electric)

Superior Mfg. Co., The,
Gregg St., Carnegie, Pa.

HEATERS AND PURIFIERS (Feed Water)

Davis Engineering Co.,
90 West St., New York City.
Griscom-Russell Co.,
285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

HEATING EQUIPMENT

Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

HOISTING ENGINES

Hyde Windlass Co., Bath, Me.

HOISTS (Air)

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.

INDICATORS (Direction & Revolution)

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

INDICATORS (Helm Angle)

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

INDICATORS (Speed)

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

INSURANCE (Marine)

Boland & Cornelius,
Marine Trust Bldg., Buffalo, N. Y.

LAMPS (Mazda and Arc)

General Electric Co.,
Schenectady, N. Y.

LIFEBOATS

Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIFESAVING EQUIPMENT

Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT

General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

LUBRICATING OIL

Vacuum Oil Co.,
61 Broadway, New York City.

MACHINERY (Marine)

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Cooper-Bessemer Corp., The,
Mt. Vernon, Ohio.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Shipbuilding Corp.,
Manitowoc, Wis.

MACHINISTS

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co.,
Camden, N. J.

MAGNETS (Lifting)

Cutler-Hammer, Inc.,
1265 St. Paul Avenue,
Milwaukee, Wis.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE RAILWAY BUILDERS

Crandall Engineering Co., The,
134 Main St., Cambridge, Mass.

METERS (Gas & Air)

Cutler-Hammer, Inc.,
1265 St. Paul Avenue,
Milwaukee, Wis.

MOTOR GENERATOR SETS

General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

MOTORS

Diehl Mfg. Co.,
Elizabethport, N. J.

MOTORS (Electric)

General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS

Ritchie. E. S., & Sons,
Brookline, Mass.
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

NAVIGATING INSTRUMENTS

White, Kelvin & Wilfrid O., Co.,
112 State St., Boston, Mass.

OAKUM (Marine, Rope, Packing, Plumbago)

Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

OIL BURNING EQUIPMENT

Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

OIL FOR ALL PURPOSES (Marine)

Vacuum Oil Co., 61 Broadway,
New York City.

PACKING SERVICE

Export Fibreboard Case Assoc.,
155 Montgomery St.,
San Francisco, Cal.

PACKING CASES (Fibreboard)

Export Fibreboard Case Assoc.,
155 Montgomery St.,
San Francisco, Cal.

PASSENGER SERVICE

Hamburg-American Line,
39 Broadway, New York City.

POWDERED COAL BURNERS

Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

PROPELLER BLADES AND HUBS

Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Great Lakes Engineering Works,
River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
Reading, E. H.,
226 Ohio St., Buffalo, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLERS

Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.

PULVERIZED COAL BURNERS

Todd Shipyards Corp.,
25 Broadway, New York City.

PULVERIZED COAL SYSTEMS

Todd Shipyards Corp.,
25 Broadway, New York City.

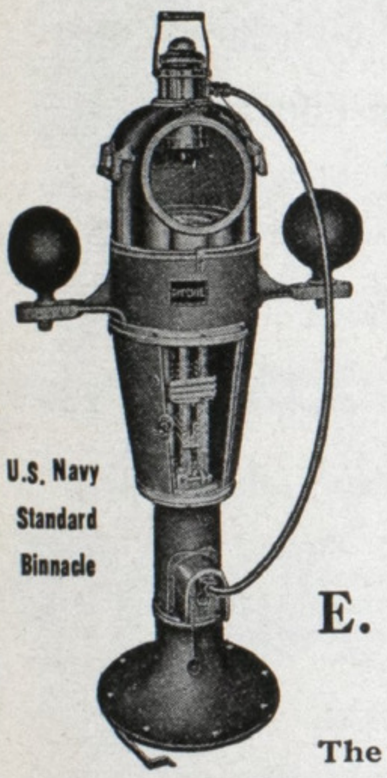
See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

"No, Sir — This is a good boat and it needs a good railway" ◆ ◆ ◆

Yachtsmen are rightly demanding that their boats be hauled on good railways . . . and they know that a CRANDALL RAILWAY is always reliable

THE CRANDALL ENGINEERING COMPANY
Cambridge, Mass., U. S. A.

Designers and Builders of
Floating and Railway Drydocks — Yacht Railways — Marine Turntables
Yacht Yard Layouts — Vertical Lifts

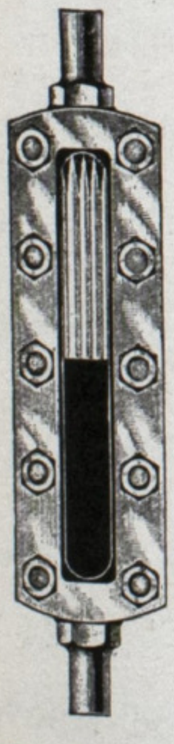


U.S. Navy Standard Binnacle

THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.
Used Exclusively in U. S. Navy for over 40 years.
Over 65,000 on Merchant Vessels in all parts of the world.
Made in all sizes 2 to 12" dia.
Magnets for adjusting Purposes.

E. S. RITCHIE & SONS
Brookline, Mass., U. S. A.
Agents for the Great Lakes,
The Upson-Walton Company, Cleveland, Ohio



REFLEX WATER GAGES

Used on all types of boilers by all the Principal Navies of the world

"The Water Shows Black"

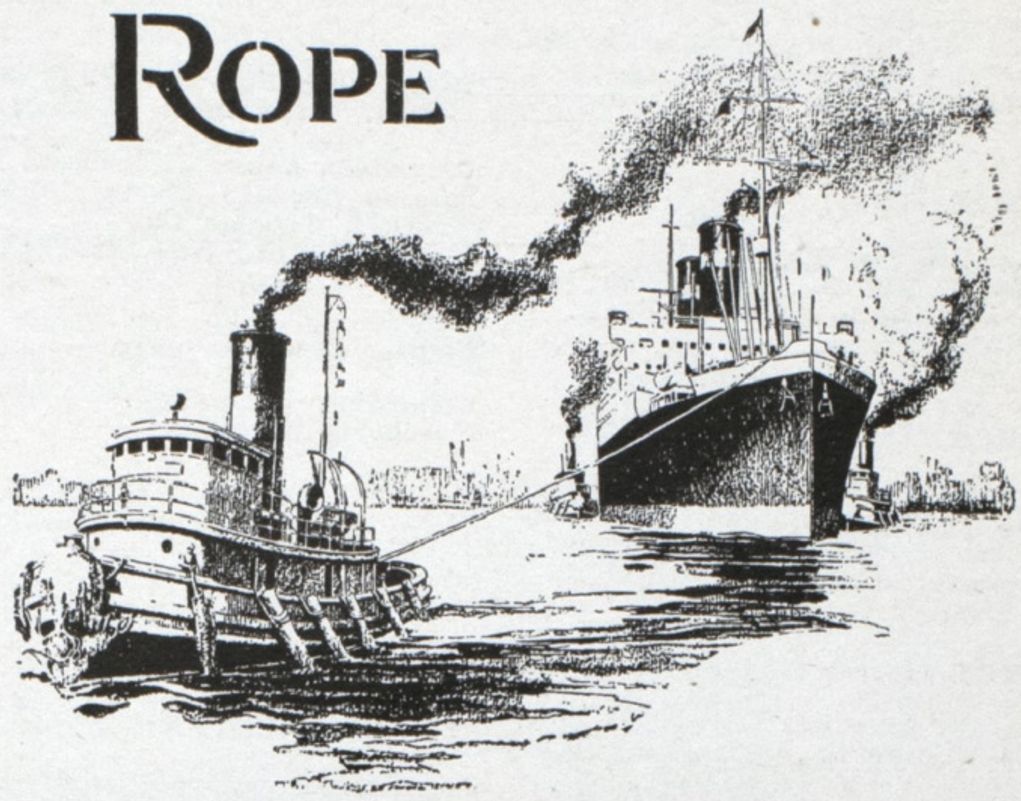
ADVANTAGES: Quick and reliable observation of the water level. Safe, sure and durable at high pressure. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with WATER the Reflex Gage always appears BLACK. When empty it instantly shows WHITE. No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus

MANUFACTURED BY THE
JERGUSON GAGE & VALVE CO.
WINTER HILL, SOMERVILLE, MASS.

WATERFLEX ROPE



THE superior strength, endurance and water-resisting qualities of **WATERFLEX** —*the scientifically lubricated rope*— in the heaviest hoisting, hauling and towing operations have made it the choice of critical users and discriminating buyers of cordage.

In the manufacture of **WATERFLEX** the patented waterproofing compound permeates the fibres and also forms a protective exterior coating.

As the compound will not emulsify, **WATERFLEX** is rendered impervious to the elements as well as to wet and dry rot, and retains its moisture-proof qualities, uniform lay and remarkable strength until literally worn out.

You pay no more for **WATERFLEX** with its many proven advantages than for ordinary cordage.

WHITLOCK CORDAGE COMPANY
46 South Street, New York

PUMPS

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Great Lakes Engineering Works,
River Rouge, Mich.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Ballast)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Bilge)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Boiler Feed)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Direct Acting)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Fuel Oil)

Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

PUMPS (Power)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Steam)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Vacuum)

Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

RAILWAY DRY DOCKS

Crandall Engineering Co., The,
134 Main St., Cambridge, Mass.

REPAIRS (Electric)

General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

REPAIRS (Marine)

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Charleston Dry Dock & Machine Co.,
Charleston, S. C.
Chicago Shipbuilding Co.,
So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks, Inc.,
11 Broadway, New York City.

REPAIRS (Turbine)

General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

REVOLUTION COUNTERS

Sperry Gyroscope Co.,
Brooklyn, N. Y.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)

Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

ROPE (Transmission)

Columbian Rope Co.,
Auburn, N. Y.

ROPE OAKUM

Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

RUST PREVENTATIVE (Oil)

Vacuum Oil Co., 61 Broadway,
New York City.

SAFETY VALVES (Marine)

Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.

SEARCHLIGHTS

General Electric Co.,
Schenectady, N. Y.

SEARCHLIGHTS (High Intensity)

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

SEPARATORS (Oil)

Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.

SHIPBUILDERS

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Charleston Dry Dock & Machine Co.,
Charleston, S. C.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks, Inc.
11 Broadway, New York City.

SHIPBUILDING SYSTEMS

Isherwood, J. W., & Co., Ltd.,
17 Battery Place, New York City.

SHIP STABILIZERS

Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

SPUN OAKUM

Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight)

Hamburg-American Lines,
39 Broadway, New York City.

STEAM GAGES

Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

STEAMSHIP COMPANIES (Lake Passenger & Freight)

Cleveland & Buffalo Transit Co.,
The, E. 9th St. Pier, Cleveland.

STEAM TRAPS

Davis Engineering Co.,
90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES

Hyde Windlass Co., Bath, Me.

STEERING GEARS

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STOKERS

Babcock & Wilcox Co., The,
85 Liberty St., New York City.

STORAGE BATTERIES—See BATTERIES

STRAINERS (Oil)

Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

SUPERHEATERS

Babcock & Wilcox Co., The,
85 Liberty St., New York City.

SWITCHBOARDS

General Electric Co.,
Schenectady, N. Y.
I. T. E. Circuit Breaker Co.,
19th & Hamilton St.,
Philadelphia, Pa.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

TELEMOTORS

Hyde Windlass Co., Bath, Me.

TOWING LINES

Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co.,
46 South St., New York City.

TRACTORS

Clark Tructractor Co.,
Battle Creek, Mich.
Elwell-Parker Electric Co., The,
4205 St. Clair Ave., Cleveland, O.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRUCKS

Clark Tructractor Co.,
Battle Creek, Mich.
Elwell-Parker Electric Co., The,
4205 St. Clair Ave., Cleveland, O.

TRUCKS (Dump)

Clark Tructractor Co.,
Battle Creek, Mich.

TURBINES (Electric)

Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TURBINES (Marine)

Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
General Electric Co.,
Schenectady, N. Y.
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TURBINES (Steam)

DeLaval Steam Turbine Co.,
Trenton, N. J.
General Electric Co.,
Schenectady, N. Y.
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TWINE AND ROPE

Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

VENTILATING EQUIPMENT

Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

WATER COOLERS

General Electric Co.,
Schenectady, N. Y.

WATER PURIFICATION SYSTEMS

Griscom-Russell Co.,
285 Madison Ave., New York City.

WELDERS (Electric Arc)

General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

WHISTLES

Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

WINCHES

Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Dake Engine Co.,
Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

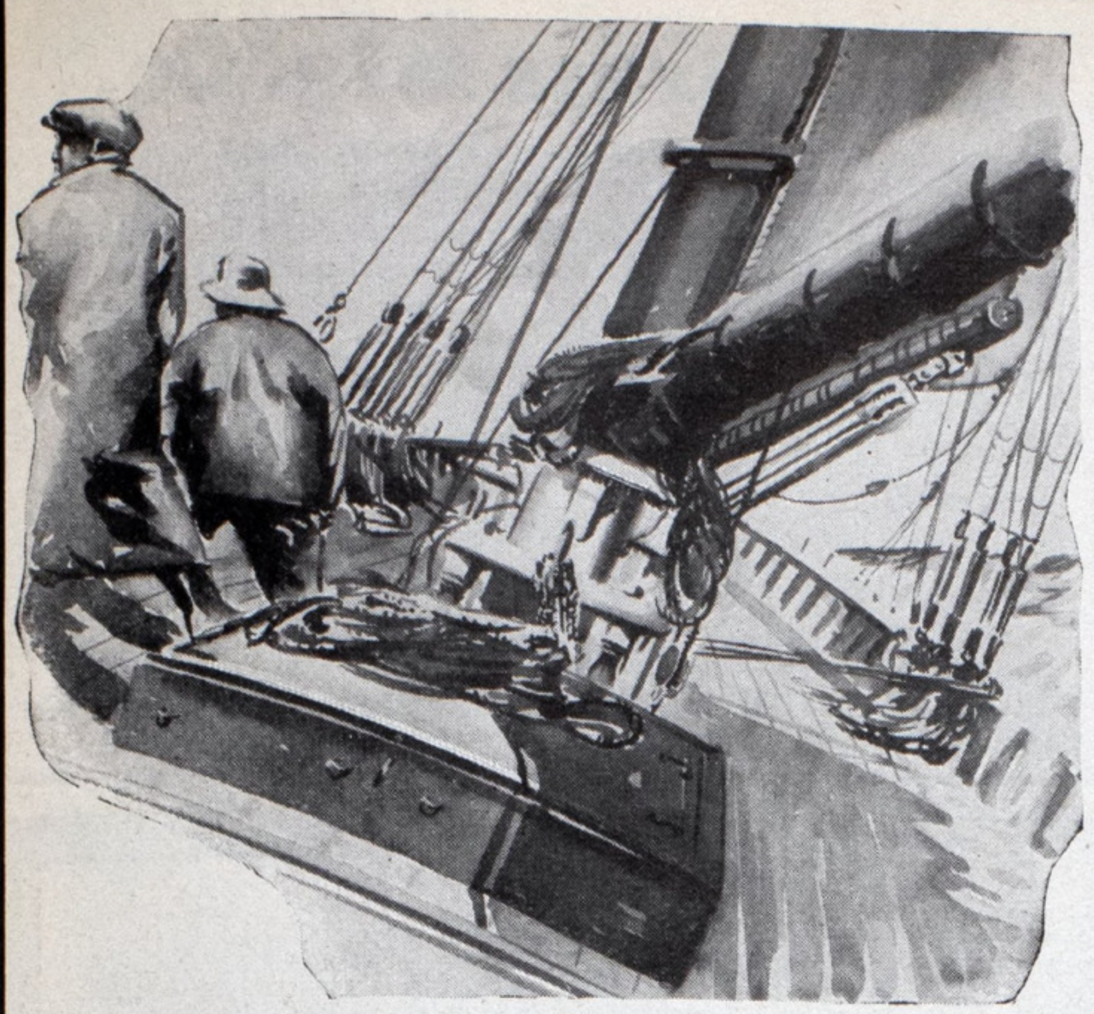
WINDLASSES

American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Dake Engine Co.,
Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDOWS (Balanced Frameless)

Kearfoot Engineering Co.,
117 Liberty St., New York City.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



"Then Ho for the sea so damp and free"

Deep sea sailormen realize that in a well-caulked tight bottom lies not only the welfare of the vessel and the crew but the safe delivery of the cargo.

For a hundred years,

STRATFORD OAKUM

has been keeping the ocean out of the finest ships that sail. Sailors depend on Stratford Oakum because they know it is the best.

Stratford Oakum is most economical to use. Wastage is very small, less labor is required to spin and caulk and it "stays put," whether in deck, side or bottom.

Seams right-caulked with Stratford Oakum will stay tight longer than when any other material is used.

Be sure you get Stratford Oakum

George Stratford Oakum Company
Jersey City, New Jersey
Also Manufacturers of Cotton Wiping Waste *5

SAMSON SPOT
Log Lines

Trade Mark Reg. U.S. Pat. Off.

Smooth, tough and durable; no adulterating material to stiffen it and decrease strength and durability. Solid braided of extra quality cotton yarn. Uniform in size and quality. Easily identified by the colored spots, our trade mark.

We also manufacture flag halyards, lead lines, tiller rope; solid braided cotton cord in all sizes for various marine uses. Ask for catalog and samples.

SAMSON CORDAGE WORKS

89 Broad Street Boston, Mass.

ANDREW J. MORSE & SON, Inc.

221 High Street BOSTON, MASS.
Established 1837

Diving Apparatus and Submarine Armor
Fire Protection Equipment
The Invincible Nozzle
Catalogues on request

Propeller Wheels and Blades

to fit any hub.

Sheriffs Manufacturing Co.
Established 1854
Milwaukee. Wis.

LANE LIFEBOATS

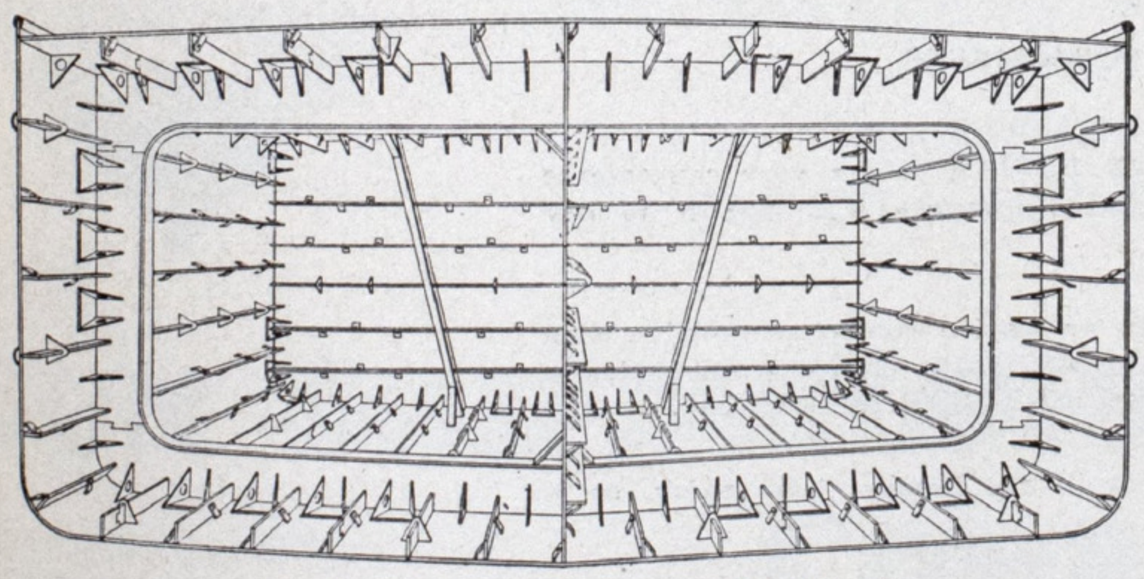
WERE SUPPLIED TO THE

BYRD ANTARCTIC EXPEDITION

C. M. Lane Lifeboat Co., Inc.

Brooklyn, N. Y.

Reduces Construction Costs—Increases Carrying Capacity



Midship Section of Transverse and Bulkhead

Marine Boilers—Barges—Scows—Lighters General Repairs to Wooden and Steel Vessels—Two Marine Railways

Used in All Types of Ship Construction Including Barges, River Steamers and Dredges
Does away entirely with Angles, Shapes, Rivets and Bolts.

Richard F. Smith

Patent granted, other patents applied for

Lock Notch Welded System

Charleston Dry Dock & Machine Company
Charleston, S. C.

Licensee for Smith System—Correspondence invited with Shipyards desiring to construct Vessels on this System—Reasonable Royalties.

Classified Advertisements

For Sale and Miscellaneous—Help and Positions Wanted

For Sale and Miscellaneous Advertisements
10c per word—minimum advertisements—$3.00

Six words must be added for box address.

To insure insertion, advertisements must reach us by the 10th of the month preceding date of issue.

Help Wanted Advertisements
6c per word—minimum advertisement—$3.00

Position Wanted Advertisements
4c per word—minimum advertisement—$1.00

Please have remittance accompany order.

For Sale

FOR SALE

WOODEN TOW BARGE N. C. HOLLAND

187′ Keel 32′ Beam 11′ 2″ Depth.

O. W. Blodgett, Bay City, Mich.

STEAMERS FOR SALE

Freight Steamer "Boston"—292.6 x 63 x 20.4 ft. Gr. Tonnage 3676.

Passenger and Freight Steamer "Georgia"—280 x 40 x 15 ft. Gr. Tonnage 1749.

Passenger and Freight Steamer "Tennessee"—245 x 38 x 15.8 ft. Gr. Tonnage 1240.

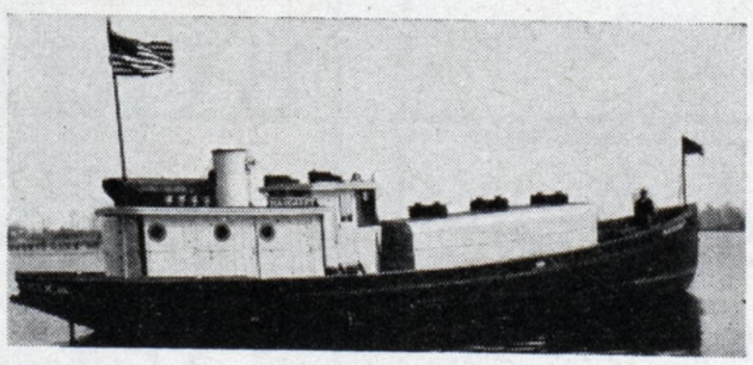
For particulars inquire of C. E. Smith, Vice-President, New England Steamship Co., 209 General Office Bldg., New Haven, Conn., or J. H. Lofland, General Manager, Pier 14, North River, New York City.

FOR SALE: SANDSUCKER KEWANEE. Capacity 110 yards. Ten inch Morris pump. Fore and aft compound engine. Scotch boiler, 150 lbs. steam. Will sell cheap as we have larger boat. Valley Sand Co., Bay City, Mich.

For Sale

FOR SALE—STEEL DUMP BARGE

Sealed Bids will be received up to 10 A. M., July 15, 1931 and then opened for the sale of Steel Dump Barge—90 x 30 x 10 Ft. at Hopper Ends. Full information on application. Address City Engineer, Miami Beach, Florida.



FOR SALE: JUST COMPLETED OIL TANK delivery boat Margaret, 24,500 gal. capacity, six compartments driven by 100 H.P. Fairbanks Morse Semi Diesel Engine. If interested write E. L. Taylor, 2712 Chesterfield Blvd., Norfolk, Va.

For Sale

FOR SALE

WOODEN TOW BARGE PESHTIGO

201′ Keel 37′ Beam 12′ Depth.

O. W. Blodgett, Bay City, Mich.

FOR SALE

TUG "JOHN E. MEYER"

Heavy steel hull 108′ long, 24′ beam 14′ draft
Triple expansion engine 15½, 26, 44 x 26″.
Scotch Marine Boiler 180 pounds working pressure.

SCOW "AMERICA"

Wood hull 180′ long, 48′ beam, 14′ draft.
1800 Ton capacity—two derricks with 3-yard and 2-yard clamshell buckets.
Both tug and scow in excellent operating condition.
For further details write

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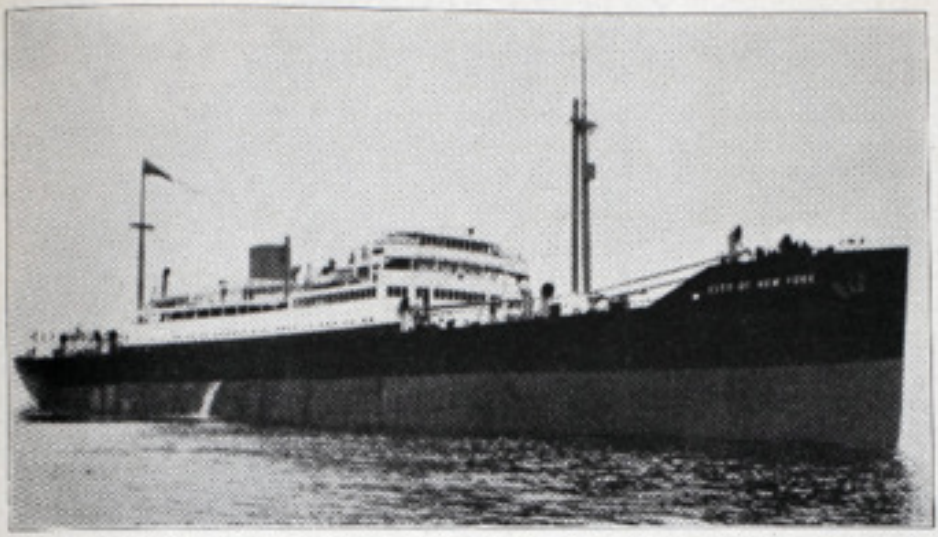

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Challenger	3,000	11,600
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Aurora	3,000	10,200
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Bidwell	3,000	10,200
Chester Sun	2,800	13,452
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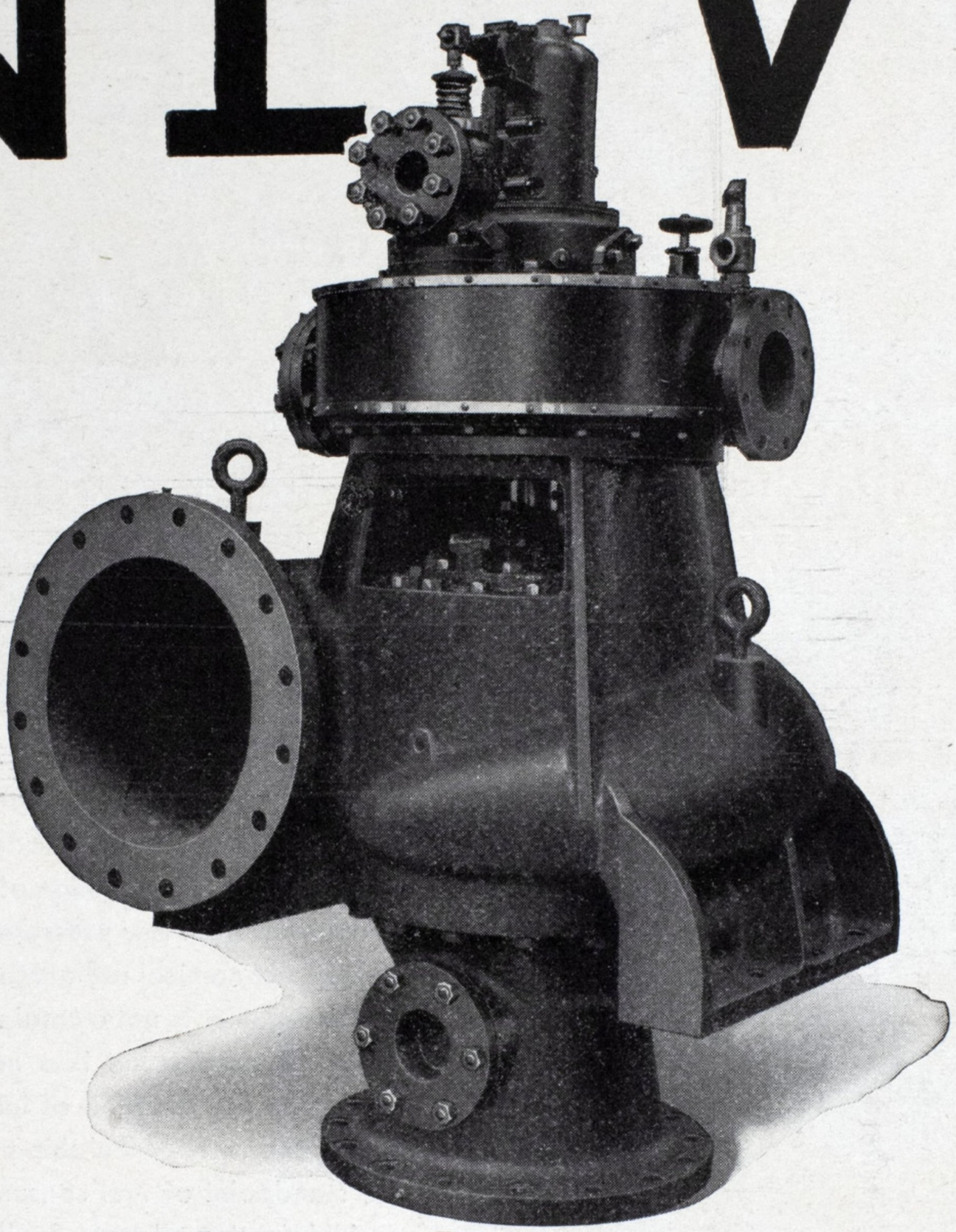

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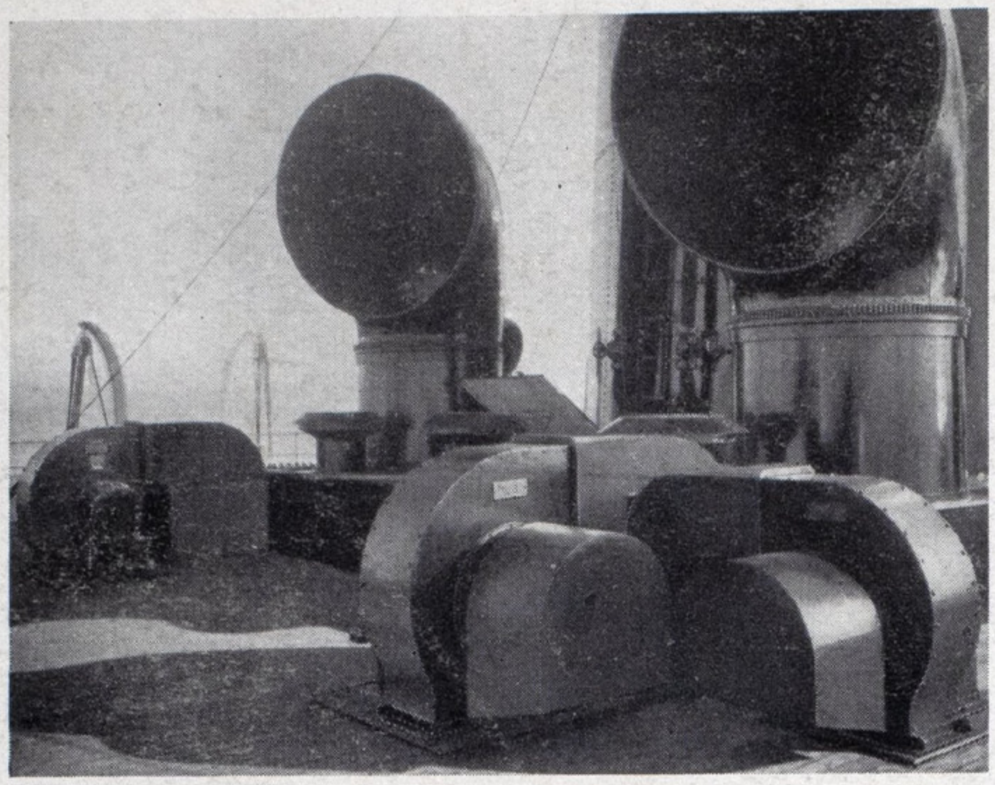

They can't help it

If the crew on your vessel hasn't adequate ventilation of its quarters, you can't expect that they will do their best when they are on duty. They can't help it if they feel groggy. If their sleep is disturbed and they do not get the proper amount of rest, naturally they will not feel up to par.

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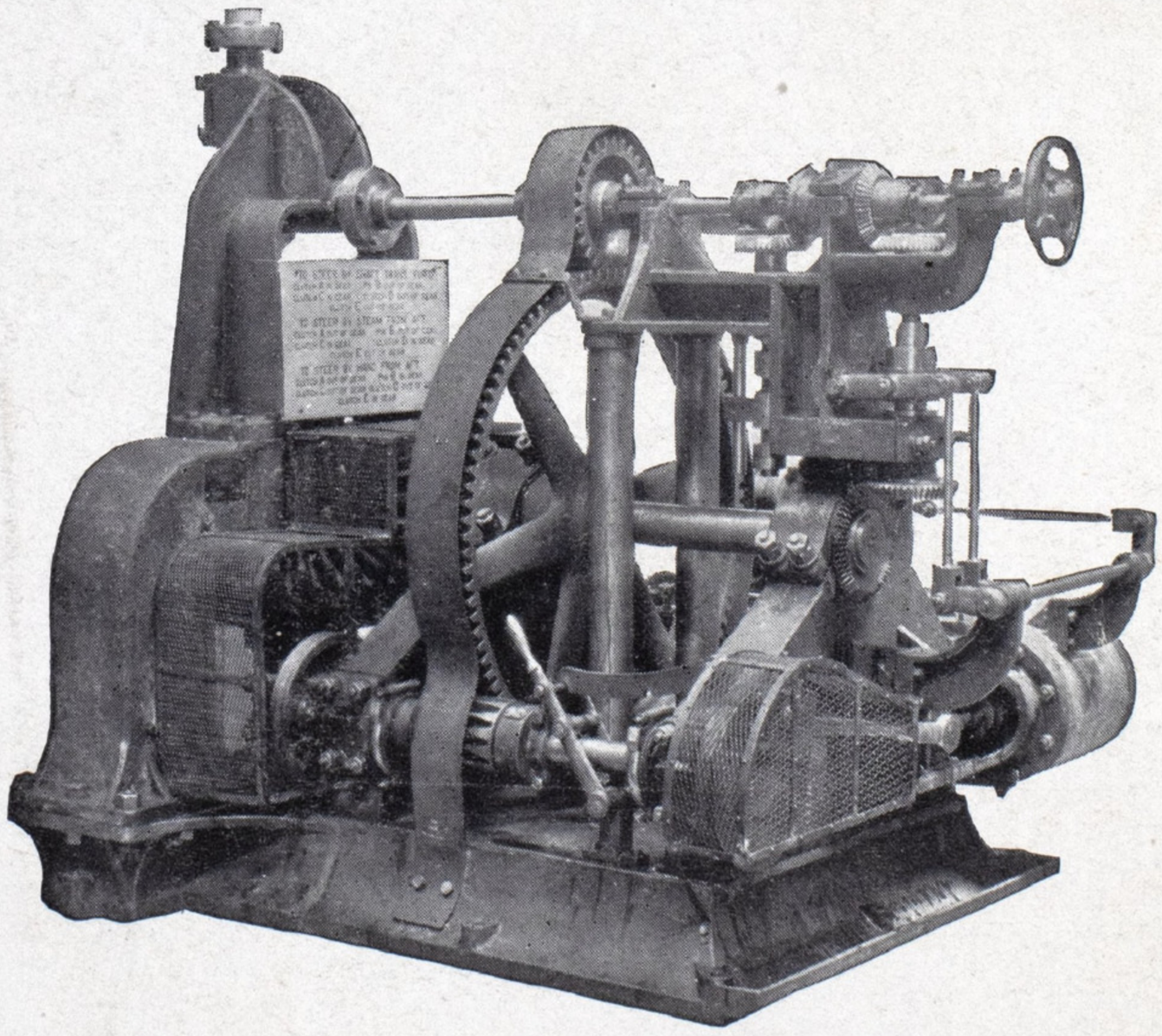

HYDE Quadrant Type Steering Gear

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